Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

BIOLOGY

Course Code (**FMS114**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

I. Course Identification and General Information:

1.	**Course Title:**	**BIOLOGY**					
2.	**Course Code &Number:**	**FMS114**					
3.	**Credit hours:**	C.H					TOTAL
		L.	Tut.	S.	P.	Tr.	
		2	-	-	1	-	**3**
4.	**Study level/ semester at which this course is offered:**	*(first) Year – (1st) semester*					
5.	**Pre –requisite (if any):**	**None**					
6.	**Co –requisite (if any):**	**None**					
7.	**Program (s) in which the course is offered:**	**All programs of Faculty of medical sciences**					
8.	**Language of teaching the course:**	**ENGLISH**					
9.	**Location of teaching the course:**	**At the University facility**					
10.	**Prepared by**						
11.	**Date of Approval**						

L: lecturing; Tut: Tutorial, S: seminar; P: practical; Tr.: training

II. Course Description:

The course provides the student with basic knowledge of life structures and the differences between living organisms and non-living organisms, classification of living organisms, chemical context of life, basic processes in living organisms, cell structure and function and life cycle. The course also provides the student the skills to operate light microscopy and handling Microscopical samples which the student will use in specific pharmacy courses such as physical pharmacy and Pharmacognosy,

يزود المقرر الطالب بالمعرفة الأساسية لهياكل الحياة والاختلافات بين الكائنات الحية والكائنات غير الحية، وتصنيف

الكائنات الحية، والسياق الكيميائي للحياة، والعمليات الأساسية في الكائنات الحية، وهيكل الخلية ووظيفتها ودورة حياتها. كما يكسب المقرر الدراسي الطلاب مهارة تشغيل جهاز الفحص المجهري الضوئي ومهارة التعامل مع العينات المجهرية و هذه المهارات سيحتاجها الطالب في مقررات تخصصية في البرنامج مثل الصيدلة الفيزيائية وعلم العقاقير

III. Intended learning outcomes of the course(CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignments of CILOs to PILOs

PILOs		CILOs
Knowledge and Understanding: Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Identify the biological structures of living organisms, the common features of Life process& the common genera & species of animal kingdom.
		a2. Describe the functions & components of the cell as the basic unit of life.
		a3. Determine the basic processes in the cell and its life cycle.
		a4. Explicit the Energy sources in living organisms
		a5. Explain the role of enzymes &the Chemical constituents of the protoplasm in the cell.
		a6. Discuss Mendel experiments and the molecular basis of inheritance : chromosome, DNA, genes
Intellectual skills: Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to	**b1.** Classify living organisms into kingdoms, genera and species

	pharmacy practice	**b2.** Differentiate between living organisms& non-living things and between animal cell and plant cell.
		b3. Relate hereditary to genetic factors.

Professional and practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.**Handle efficiently and safely different biological samples in the biology lab.
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate successfully the light microscope and other instruments used in the biology lab.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues and teachers.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the ability of time management, self-learning and problem-solving skills**.**
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.**Work successfully in team-work in the biology lab

2. Alignments of CILOs to teaching strategies & assessment strategy

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the biological structures of living organisms, the common features of Life process& the common genera & species of animal kingdom.	**Active Lecture, laboratory practice**	**written exam , Practical assessment (Lab accomplishments, Lab. Reporting , practical exam)**
a2. Describe the functions & components of the cell as the basic unit of life.	**Active Lecture, feed-back learning**	**written exam, assignment**
a3. Determine the basic processes in the cell and its life cycle.	**Active Lecture, feed-back learning, Group-project.**	**written exam , assignment**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify living organisms into kingdoms, genera and species	**Active Lecture, feed-back learning**	**written exam , quizzes**
b2. Differentiate between living organisms& non-living things and between animal cell and plant cell.		
b3. Relate hereditary to genetic factors**.**	**Active Lecture, feed-back learning**	**written exam, quizzes**

(c) Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely different biological samples in the biology lab.	**Lab. Practice**	**Lab. term works, final practical exam**
c2. Operate successfully the light microscope and other instruments used in the biology lab.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues and teachers.	**Lab. Practice, Group-project**	**Lab. term works, final practical exam,**

d3. Work successfully in team-work in the biology lab		**assignment**
d2. Demonstrate the ability of time management, self-learning and problem-solving skills**.**	**Lab. Practice, feed-back learning**	**Lab. term works, final practical exam, assignment**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	Learning Outcomes	Sub Topics List	No. of Weeks	contact hours
1	**Scope of Biology**	a1, a2, b2	• Definitions and brief history of biology • Living organisms and Non-Living things • Chemical context of life • Common features of Life process . • Biological structures of living organisms: cell, tissue, organ, system. • Energy sources in living organisms	4	8
2	**The cell: the basic unit of life**	a3, a4, a5, b2	• Structure and components of the cell: cell membranes: types, Functions and properties, cytoplasm, Micro and macro molecules of cell • Function of enzymes &Chemical constituents of the protoplasm • basic process in the cell (respiration, nutrition, etc.) • life cycle of the cell • differences between animal and plant cell.	4	8
MID-TERM EXAM				1	2
3	**animal kingdom**	a1, b1	• classification of living organisms into kingdoms, genera and species. • Animal kingdoms classification: Genera and species; common features, diversity &reproduction. • Examples of common species of general of animal kingdoms and their anatomical features.	3	6
4	**Inheritance**	a6, b3	• Mendel Experiments and the Gene Idea • Molecular basis of inheritance : chromosome, DNA, genes	2	4

Course Review and discussion session	1	2
FINAL - EXAM	1	2
TOTAL	16	32
Number of Weeks /and Units Per Semester	16	4

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Learning Outcomes
1.	Introduction to biology lab: safety, tools, instruments, scope of experiments and reporting assignments.	1	2	c1, c2, c3, c4, d3, d1, d2,
2.	Structure & components of the cells: using illustrative models	1	2	a2, c1, c2, c3, c4, d3, d1, d2
3.	Light microscope: sample preparations, operation	2	4	c1, c2, c3, c4, d3, d1, d2
4.	Differentiation between animal and plant cells.	1	2	b2, c1, c2, c3, c4, d3, d1, d2
5.	Common species of animal genera: morphological and Microscopical features	4	2	a1, b1, c1, c2, c3, c4, d3, d1, d2
6.	Molecular basis of hereditary using illustrative models.	1	2	a6, b3, c1, c2, c3, c4, d3, d1, d2
7.	Mendel experimentation of hereditary	1	2	a6, b3, c1, c2, c3, c4, d3, d1, d2
PRACTICAL EXAM		1	2	c1, c2, c3, c4, d3, d1, d2
Total		12	24 equivalent to 12 credit hours	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector. A
Active Lecture –discussion: a short Active Lecture/ address followed by discussion
Laboratory practice: students doing experiments in labs individually or in small groups.
Feed-back learning: students are individually asked to do certain assignments such as summarizing, internet search, make charts or solve mathematical problems related to the courses topics. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	**Individual**: every student is assigned to do a search report of an enzyme/ chemical constituent in the cell	d2	4-13	3
2	**Group** : each group of students will be assigned to do a search-report about genetic elements	d1, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4, b5, b6, b7
		Assignments	7, 12	5	5	d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a5, b2, b3
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, a4, a5, b1, b2, b3, b4, b5, b6, b7
TOTAL				70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	10	c1, c2, d1, d2, d3
2		Accomplishments		5	10	
3	Final exam (practical)		12	20	20	c1, c2, d1, d2
Total				30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Paul Doerder. Ralph Gibson. General Biology, , 2015, Wikimedia.

2- Essential References.

Lisa Bartee & Christine Anderson. General Biology I, II. 2018, Open Oregon Educational Resources.

3- Electronic Materials and Web Sites *etc*.

https://upload.wikimedia.org/wikipedia/commons/4/40/GeneralBiology.pdf

IX. Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the Active Lecture will not be allowed to attend the Active Lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating:** Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism:** Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of **BIOLOGY**

I. Course Identification and General Information:

1.	**Course Title:**	**BIOLOGY**					
2.	**Course Code &Number:**	**FMS114**					
3.	**Credit hours:**	C.H					TOTAL
		L.	Tut.	S.	P.	Tr.	
		2	-	-	1	-	**3**
4.	**Study level/ semester at which this course is offered:**	*(first) Year – (1st) semester*					
5.	**Pre –requisite (if any):**	**None**					
6.	**Co –requisite (if any):**	**None**					
7.	**Program (s) in which the course is offered:**	**All programs of Faculty of medical sciences**					
8.	**Language of teaching the course:**	**ENGLISH**					
9.	**Location of teaching the course:**	**At the University facility**					
10.	**Prepared by**						
11.	**Date of Approval**						

II. Course Description:

The course provides the student with basic knowledge of life structures and the differences between living organisms and non-living organisms, classification of living organisms, chemical context of life, basic processes in living organisms, cell structure and function and life cycle. The course also provides the student the skills to operate light microscopy and handling Microscopical samples which the student will use in specific pharmacy courses such as physical pharmacy and Pharmacognosy,

يزود المقرر الطالب بالمعرفة الأساسية لهياكل الحياة والاختلافات بين الكائنات الحية والكائنات غير الحية، وتصنيف الكائنات الحية، والسياق الكيميائي للحياة، والعمليات الأساسية في الكائنات الحية، وهيكل الخلية ووظيفتها ودورة حياتها. كما يكسب المقرر الدراسي الطلاب مهارة تشغيل جهاز الفحص المجهري الضوئي ومهارة التعامل مع العينات المجهرية و هذه المهارات سيحتاجها الطالب في مقررات تخصصية في البرنامج مثل الصيدلة الفيزيائية وعلم العقاقير

III. Intended learning outcomes of the course(CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignments of CILOs to PILOs

PILOs		CILOs
Knowledge and Understanding: Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Identify the biological structures of living organisms, the common features of Life process& the common genera & species of animal kingdom.
		a2. Describe the functions & components of the cell as the basic unit of life.
		a3. Determine the basic processes in the cell and its life cycle.
		a4. Explicit the Energy sources in living organisms
		a5. Explain the role of enzymes &the Chemical constituents of the protoplasm in the cell.
		a6. Discuss Mendel experiments and the molecular basis of inheritance : chromosome, DNA, genes
Intellectual skills: Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Classify living organisms into kingdoms, genera and species
		b2. Differentiate between living organisms& non-living things and between animal cell and plant cell.
		b3. Relate hereditary to genetic factors.

Professional and practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.**Handle efficiently and safely different biological samples in the biology lab.
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate successfully the light microscope and other instruments used in the biology lab.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues and teachers.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the ability of time management, self-learning and problem-solving skills**.**
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.**Work successfully in team-work in the biology lab

2. Alignments of CILOs to teaching strategies & assessment strategy

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the biological structures of living organisms, the common features of Life process& the common genera & species of animal kingdom.	**Active Lecture, laboratory practice**	**written exam , Practical assessment (Lab accomplishments, Lab. Reporting , practical exam)**
a2. Describe the functions & components of the cell as the basic unit of life.	**Active Lecture, feed-back learning**	**written exam, assignment**
a3. Determine the basic processes in the cell and its life cycle.	**Active Lecture, feed-back learning,**	**written exam, assignment**

	Group-project.	
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify living organisms into kingdoms, genera and species	**Active Lecture, feed-back learning**	**written exam , quizzes**
b2. Differentiate between living organisms& non-living things and between animal cell and plant cell.		
b3. Relate hereditary to genetic factors**.**	**Active Lecture, feed-back learning**	**written exam, quizzes**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely different biological samples in the biology lab.	**Lab. Practice**	**Lab. term works, final practical exam**
c2. Operate successfully the light microscope and other instruments used in the biology lab.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues and teachers.	**Lab. Practice, Group-project**	**Lab. term works, final practical exam, assignment**
d3. Work successfully in team-work in the biology lab		
d2. Demonstrate the ability of time management, self-learning and problem-solving skills**.**	**Lab. Practice, feed-back learning**	**Lab. term works, final practical exam, assignment**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	Learning Outcomes	Sub Topics List	No. of Weeks	contact hours
1	**Scope of Biology**	a1, a2, b2	• Definitions and brief history of biology • Living organisms and Non-Living things • Chemical context of life • Common features of Life process . • Biological structures of living organisms: cell, tissue, organ, system. • Energy sources in living organisms	4	8
2	**The cell: the basic unit of life**	a3, a4, a5, b2	• Structure and components of the cell: cell membranes: types, Functions and properties, cytoplasm, Micro and macro molecules of cell • Function of enzymes &Chemical constituents of the protoplasm • basic process in the cell (respiration, nutrition, etc.) • life cycle of the cell • differences between animal and plant cell.	4	8
MID-TERM EXAM				1	2
3	**animal kingdom**	a1, b1	• classification of living organisms into kingdoms, genera and species. • Animal kingdoms classification: Genera and species; common features, diversity &reproduction. • Examples of common species of general of animal kingdoms and their anatomical features.	3	6
4	**Inheritance**	a6, b3	• Mendel Experiments and the Gene Idea • Molecular basis of inheritance : chromosome, DNA, genes	2	4
Course Review and discussion session				1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16	4

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Learning Outcomes
1.	Introduction to biology lab: safety, tools, instruments, scope of experiments and reporting assignments.	1	2	c1, c2, c3, c4, d3, d1, d2,
2.	Structure & components of the cells: using illustrative models	1	2	a2, c1, c2, c3, c4, d3, d1, d2
3.	Light microscope: sample preparations, operation	2	4	c1, c2, c3, c4, d3, d1, d2
4.	Differentiation between animal and plant cells.	1	2	b2, c1, c2, c3, c4, d3, d1, d2
5.	Common species of animal genera: morphological and Microscopical features	4	2	a1, b1, c1, c2, c3, c4, d3, d1, d2
6.	Molecular basis of hereditary using illustrative models.	1	2	a6, b3, c1, c2, c3, c4, d3, d1, d2
7.	Mendel experimentation of hereditary	1	2	a6, b3, c1, c2, c3, c4, d3, d1, d2
PRACTICAL EXAM		1	2	c1, c2, c3, c4, d3, d1, d2
Total		12	24 equivalent to 12 credit hours	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or Concepts **map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector. A

Laboratory practice: students doing experiments in labs individually or in small groups.

Feed-back learning: students are individually asked to do certain assignments such as summarizing, internet search, make charts or solve mathematical problems related to the courses topics. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	**Individual**: every student is assigned to do a search report of an enzyme/ chemical constituent in the cell	d2	4-13	3
2	**Group** : each group of students will be assigned to do a search-report about genetic elements	d1, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4, b5, b6, b7
		Assignments	7, 12	5	5	d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a5, b2, b3
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, a4, a5, b1, b2, b3, b4, b5, b6, b7
TOTAL				70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	10	c1, c2, d1, d2, d3
2		Accomplishments		5	10	
3	Final exam (practical)		12	20	20	c1, c2, d1, d2
Total				30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Paul Doerder. Ralph Gibson. General Biology, , 2015, Wikimedia.

2- Essential References.

Lisa Bartee & Christine Anderson. General Biology I, II. 2018, Open Oregon Educational Resources.

3- Electronic Materials and Web Sites *etc*.

https://upload.wikimedia.org/wikipedia/commons/4/40/GeneralBiology.pdf

IX. Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the Active Lecture will not be allowed to attend the Active Lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating:** Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism:** Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

GENERAL CHEMISTRY

Course Code (**FMS115**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

I. Course Identification and General Information:

12.	Course Title:	General chemistry					
13.	Course Code &Number:	FMS115					
14.	Credit hours:	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	3
15.	Study level/ semester at which this course is offered:	*(FIRST) Year – (1^{ST}) semester*					
16.	Pre –requisite (if any):	None					
17.	Co –requisite (if any):	NONE					
18.	Program (s) in which the course is offered:	All programs in the faculty of medical sciences					
19.	Language of teaching the course:	ENGLISH					
20.	Location of teaching the course:	At the university facility					
21.	Prepared by						
22.	Date of Approval						

L: lecturing; Tut: Tutorial , S: seminar ; P: practical ; Tr.: training

II. Course Description:

The course provides the student basic knowledge of chemistry of matters including chemical structure theories periodic table of elements, chemical bonds, electronegativity, polarity, acidity, basicity, ionization constant, Quantum in chemistry, types of Chemical reactions and equilibrium. The practical part of the course is designed to provide the student practical skills of how to safely and effectively perform tests of chemical reactions and identification. Such knowledge and skills will help the student in performing such practice while studying more specific related courses e.g. pharmaceutical analytical chemistry, pharmaceutical organic chemistry and medicinal chemistry.

يزود المقرر الطالب بالمعرفة الأساسية في الكيمياء بما في ذلك نظريات التركيب الكيميائي في المادة والجدول الدوري للعناصر، والروابط الكيميائية، والصفات الكيميائية للمادة مثل السالبة الكهربية، والقطبية، والحموضة، والقاعدة، وثابت التأين، والكم، وأنواع التفاعلات الكيميائية توازنها، كما تم تصميم الجزء العملي من المقرر لتزويد الطالب بالمهارات العملية حول كيفية إجراء اختبارات التفاعلات الكيميائية وتحديد الهوية بأمان وفعالية. ستكسب هذه المعرفة والمهارات الطالب القدرة على أداء مثيلاتها أثناء دراسة مقررات أكثر صلة بالتخصص ذات على سبيل المثال الكيمياء التحليلية الصيدلانية والكيمياء العضوية الصيدلانية والكيمياء الدوائية.

III. Intended learning outcomes of the course: (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		Intended learning outcomes of the course (CILOs)
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Explain the roles of chemistry in modern sciences .
		a2. Explicit the chemical structures of matters and their chemical properties
A3	Explain physicochemical properties of materials and products	**a3.** Discuss the principles and types of chemical reactions
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the type of chemical compound based on bond formed between atoms
		b2 . Solve chemical problems related to chemical formula, electronic configuration , quantum (molecular weight, molarity, normality), pH, ionization constant and pKa.
		b3. Interpret the electronic configuration and transition in atoms
		b4. Compare between the different types of chemistry disciplines and also between inorganic and organic compounds.
		b5 . Express the chemical compounds and elements using abbreviate letters.
		b6. Relate the atom reactivity to electronic configuration to.
		b7. Predict the outcomes of a chemical reaction between two chemical entities.

Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the chemistry lab.
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the chemistry lab.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues and in teacher in the lab..
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the ability of time management, self-learning and problem-solving skills.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Work successfully in team-work during performing experiments in chemistry lab.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the roles of chemistry in modern sciences .	**Active Lecture**	**written exams**
a2. Explicit the chemical structures of matters and their chemical properties		
a3. Discuss the principles and types of chemical reactions		

(b) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret the type of chemical compound based on bond formed between atoms	**Active Lecture, feed-back learning**	**Written exams , assignment, quizzes**
b2 . Solve chemical problems related to chemical formula, electronic configuration , quantum (molecular weight, molarity, normality), pH, ionization constant and pKa.		
b3. Interpret the electronic configuration and transition in atoms		
b5 . Express the chemical compounds and elements using abbreviate letters.	**Active Lecture, feed-back learning**	**Written exams , assignment, quizzes**
b6. Relate the atom reactivity to electronic configuration to.		
b7. Predict the outcomes of a chemical reaction between two chemical entities.		
b4. Compare between the different types of chemistry disciplines and also between inorganic and organic compounds.	**Active Lecture**	**Written exams**
(c)Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the chemistry lab.	**Lab. Practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the chemistry lab.		

(d) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues and in teacher in the lab..	**Lab. Practice**	**Lab. term works, final practical exam**
d2. Demonstrate the ability of time management, self-learning and problem-solving skills.	**Lab. Practice, feed-back learning**	**Lab. practical works, individual assignment**
d3. Work successfully in team-work during performing experiments in chemistry lab.	**Lab. practice, group project**	**Lab. term works, group- assignment**

V. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	Aligned Course Learning Outcomes	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, b4	• chemistry (definition, brief history) • disciplines of chemistry : general, organic, inorganic, analytical, medicinal, physical, etc.) • importance and allocations of chemistry in modern sciences.	1	2
2	**Chemical structures**	a2, b1, b2, b3, b6	• atoms , atomic structure • electronic configuration • molecules and molecular formula, • elements, periodic table of elements, • compounds (types) • chemical bonds (ionic, covalent, etc)	3	6
3	**Chemical properties**	a2, b2	• electronegativity, dipole moments, polar and non-polar molecules • acidity, basicity. (pH), ionization constant , pKa • buffer systems	2	4
MID-TERM EXAM				1	2
4	**Quantum in chemistry**	b2	• atomic weight, molecular weight, equivalent weight, milliequivalent, moles • molarity, molality, normality	2	4
5	**Chemical reactions and equilibrium**	a3, b7, c2	• chemical reactivity, inertness, energy change and heat of reaction • chemical equations balance • reactions catalysts • acid-base reactions, Redox reactions, addition reaction, elimination reactions, substitution reactions, decomposition reactions etc.	3	6
6	**Inorganic chemistry**	b4, c2	○ Comparison between inorganic and organic compounds. ○ Identification and reactions of common inorganic compounds • Cationic radicals • Anionic radicals	3	6
Course Review and discussion session				1	2

FINAL - EXAM	1	2
TOTAL	16	32
Number of Weeks /and Units Per Semester	16 weeks	6 units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Learning Outcomes
8.	Introduction to chemistry lab: safety, td3ls, instruments, scope of experiments and reporting assignments. Chemical structures (atoms, molecules, bonds) using models	**1**	**2**	c1, c2 a2
9.	pH- meter principle and standard operation procedure: determination of pH of water, weak acids / bases determination of pH of strong acids/bases, salts	**1**	**2**	c1, c2, , d3, , d1, d2
10.	Preparation of buffers phosphate , citrate , acetate	**1**	**2**	c1, c2, , d3, , d1, d2
11.	Oxidation reactions using potassium permanganate & Decomposition reaction of sodium bicarbonate in water.	**1**	**2**	c1, c2, , d3, , d1, d2
12.	Acid/base reaction s e.g : HCl and NaOH	**1**	**2**	c1, c2, d3, , d1, d2
13.	Scheme Identification of cationic inorganic radicals	**3**	**6**	c1, c2, d3, , d1, d2
14.	Scheme Identification of anionic inorganic radicals	**3**	**6**	c1, c2, , d3, , d1, d2
PRACTICAL EXAM		**1**	**2**	a2, c1, c2,
Total		**12**	**24 equivalent to 12 credit hours**	

VI. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classrd3m. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do certain assignments such as summarizing, internet search, make charts or solve mathematical problems related to the courses topics. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical mad2er &for promoting team work skills

VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	**Individual**: every student is assigned to solve problems presented by the teacher on chemical formula, electronic configuration , quantum (molecular weight, molarity, normality), pH, ionization constant and pKa	d2	4-13	3
2	**Group** : each group of students will be assigned to do a search-report about one type of chemical reactions	d1, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4, b5, b6, b7
		Assignments	7, 12	5	5	b2, a3, d1, d2
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a5, b2, b3
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, a4, a5, b1, b2, b3, b4, b5, b6, b7
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	c1, c2,d1, d2
Total				30	30 %	

IX. Learning Resources:

1- Required Textbd3k(s) (maximum two).

David W Ball and John W Hill. The Basics of General, Organic, and Biological Chemistry. 2011, Saylor Foundation, USA

2- Essential References.

Bruce Averill and Patricia Eldredge. General Chemistry: Principles, Patterns, and Applications. 2011, Saylor Foundation, USA

3- Electronic Materials and Web Sites *etc*.

1. https://mountainscholar.org/bitstream/handle/20.500.11785/249/OTL_BookId-40_BasicsGenOrgBioChemistry.pdf?sequence=1&isAllowed=y
2.https://resources.saylor.org/wwwresources/archived/site/textbooks/General%20Chemistry%20Principle0Patterns,%20and%20Applications.pdf

X. Course Policies:

5.	**Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
6.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
7.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
8.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the faculty rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

GENERAL CHEMISTRY

I. Course Identification and General Information:

1.	Course Title:	General chemistry					
2.	Course Code &Number:	FMS115					
3.	Credit hours:	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	3
4.	Study level/ semester at which this course is offered:	*(FIRST) Year – (1ST) semester*					
5.	Pre –requisite (if any):	None					
6.	Co –requisite (if any):	NONE					
7.	Program (s) in which the course is offered:	All programs in the faculty of medical sciences					
8.	Language of teaching the course:	ENGLISH					
9.	Location of teaching the course:	At the university facility					
10.	Prepared by						
11.	Date of Approval						

II. Course Description:

The course provides the student basic knowledge of chemistry of matters including chemical structure theories periodic table of elements, chemical bonds, electronegativity, polarity, acidity, basicity, ionization constant, Quantum in chemistry, types of Chemical reactions and equilibrium. The practical part of the course is designed to provide the student practical skills of how to safely and effectively perform tests of chemical reactions and identification. Such knowledge and skills will help the student in performing such practice while studying more specific related courses e.g. pharmaceutical analytical chemistry, pharmaceutical organic chemistry and medicinal chemistry.

يزود المقرر الطالب بالمعرفة الأساسية في الكيمياء بما في ذلك نظريات التركيب الكيميائي في المادة والجدول الدوري للعناصر، والروابط الكيميائية، والصفات الكيميائية للمادة مثل السالبة الكهربية، والقطبية، والحموضة، والقاعدة، وثابت التأين، والكم، وأنواع التفاعلات الكيميائية توازنها، كما تم تصميم الجزء العملي من المقرر لتزويد الطالب بالمهارات العملية حول كيفية إجراء اختبارات التفاعلات الكيميائية وتحديد الهوية بأمان وفعالية. ستكسب هذه المعرفة والمهارات الطالب القدرة على أداء مثيلاتها أثناء دراسة مقررات أكثر صلة بالتخصص ذات على سبيل المثال الكيمياء التحليلية الصيدلانية والكيمياء العضوية الصيدلانية والكيمياء الدوائية .

III. Intended learning outcomes of the course: (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		Intended learning outcomes of the course (CILOs)
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Explain the roles of chemistry in modern sciences .
		a2. Explicit the chemical structures of matters and their chemical properties
A3	Explain physicochemical properties of materials and products	**a3.** Discuss the principles and types of chemical reactions
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the type of chemical compound based on bond formed between atoms
		b2 . Solve chemical problems related to chemical formula, electronic configuration , quantum (molecular weight, molarity, normality), pH, ionization constant and pKa.
		b3. Interpret the electronic configuration and transition in atoms
		b4. Compare between the different types of chemistry disciplines and also between inorganic and organic compounds.
		b5 . Express the chemical compounds and elements using abbreviate letters.
		b6. Relate the atom reactivity to electronic configuration to.
		b7. Predict the outcomes of a chemical reaction between two chemical entities.

Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the chemistry lab.
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the chemistry lab.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues and in teacher in the lab..
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the ability of time management, self-learning and problem-solving skills.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Work successfully in team-work during performing experiments in chemistry lab.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the roles of chemistry in modern sciences .	**Active Lecture**	**written exams**
a2. Explicit the chemical structures of matters and their chemical properties		
a3. Discuss the principles and types of chemical reactions		

(b) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret the type of chemical compound based on bond formed between atoms	**Active Lecture, feed-back learning**	**Written exams , assignment, quizzes**
b2 . Solve chemical problems related to chemical formula, electronic configuration , quantum (molecular weight, molarity, normality), pH, ionization constant and pKa.		
b3. Interpret the electronic configuration and transition in atoms		
b5 . Express the chemical compounds and elements using abbreviate letters.	**Active Lecture, feed-back learning**	**Written exams , assignment, quizzes**
b6. Relate the atom reactivity to electronic configuration to.		
b7. Predict the outcomes of a chemical reaction between two chemical entities.		
b4. Compare between the different types of chemistry disciplines and also between inorganic and organic compounds.	**Active Lecture**	**Written exams**
(c)Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the chemistry lab.	**Lab. Practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the chemistry lab.		

(d) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues and in teacher in the lab..	**Lab. Practice**	**Lab. term works, final practical exam**
d2. Demonstrate the ability of time management, self-learning and problem-solving skills.	**Lab. Practice works, feed-back learning**	**Lab. practical works, individual assignment**
d3. Work successfully in team-work during performing experiments in chemistry lab.	**Lab. practice, group project**	**Lab. term works, group- assignment**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	Aligned Course Learning Outcomes	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, b4	• chemistry (definition, brief history) • disciplines of chemistry: general, organic, inorganic, analytical, medicinal, physical, etc.) • importance and allocations of chemistry in modern sciences.	1	2
2	**Chemical structures**	a2, b1, b2, b3, b6	• atoms, atomic structure • electronic configuration • molecules and molecular formula, • elements, periodic table of elements, • compounds (types) • chemical bonds (ionic, covalent, etc)	3	6
3	**Chemical properties**	a2, b2	• electronegativity, dipole moments, polar and non-polar molecules • acidity, basicity. (pH), ionization constant, pKa • buffer systems	2	4
MID-TERM EXAM				1	2
4	**Quantum in chemistry**	b2	• atomic weight, molecular weight, equivalent weight, milliequivalent, moles • molarity, molality, normality	2	4
5	**Chemical reactions and equilibrium**	a3, b7, c2	• chemical reactivity, inertness, energy change and heat of reaction • chemical equations balance • reactions catalysts • acid-base reactions, Redox reactions, addition reaction, elimination reactions, substitution reactions, decomposition reactions etc.	3	6
6	**Inorganic chemistry**	b4, c2	○ Comparison between inorganic and organic compounds. ○ Identification and reactions of common inorganic compounds • Cationic radicals • Anionic radicals	3	6
Course Review and discussion session				1	2

FINAL - EXAM	1	2
TOTAL	16	32
Number of Weeks /and Units Per Semester	16 weeks	6 units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Learning Outcomes
15.	Introduction to chemistry lab: safety, td3ls, instruments, scope of experiments and reporting assignments. Chemical structures (atoms, molecules, bonds) using models	**1**	**2**	c1, c2 a2
16.	pH- meter principle and standard operation procedure: determination of pH of water, weak acids / bases determination of pH of strong acids/bases, salts	**1**	**2**	c1, c2, , d3, , d1, d2
17.	Preparation of buffers phosphate , citrate , acetate	**1**	**2**	c1, c2, , d3, , d1, d2
18.	Oxidation reactions using potassium permanganate & Decomposition reaction of sodium bicarbonate in water.	**1**	**2**	c1, c2, , d3, , d1, d2
19.	Acid/base reaction s e.g : HCl and NaOH	**1**	**2**	c1, c2, d3, , d1, d2
20.	Scheme Identification of cationic inorganic radicals	**3**	**6**	c1, c2, d3, , d1, d2
21.	Scheme Identification of anionic inorganic radicals	**3**	**6**	c1, c2, , d3, , d1, d2
PRACTICAL EXAM		**1**	**2**	a2, c1, c2,
Total		**12**	**24 equivalent to 12 credit hours**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classrd3m. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do certain assignments such as summarizing, internet search, make charts or solve mathematical problems related to the courses topics. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical mad2er &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	**Individual**: every student is assigned to solve problems presented by the teacher on chemical formula, electronic configuration , quantum (molecular weight, molarity, normality), pH, ionization constant and pKa	d2	4-13	3
2	**Group** : each group of students will be assigned to do a search-report about one type of chemical reactions	d1, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4, b5, b6, b7
		Assignments	7, 12	5	5	b2, a3, d1, d2
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a5, b2, b3
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, a4, a5, b1, b2, b3, b4, b5, b6, b7
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	c1, c2,d1, d2
Total				30	30 %	

VIII. Learning Resources:

1- Required Textbd3k(s) (maximum two).

David W Ball and John W Hill. The Basics of General, Organic, and Biological Chemistry. 2011, Saylor Foundation, USA

2- Essential References.

Bruce Averill and Patricia Eldredge. General Chemistry: Principles, Patterns, and Applications. 2011, Saylor Foundation, USA

3- Electronic Materials and Web Sites *etc*.

1. https://mountainscholar.org/bitstream/handle/20.500.11785/249/OTL_BookId-40_BasicsGenOrgBioChemistry.pdf?sequence=1&isAllowed=y
2.https://resources.saylor.org/wwwresources/archived/site/textbooks/General%20Chemistry%20Principle0Patterns,%20and%20Applications.pdf

IX.Course Policies:

1.	**Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the faculty rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

INTRODUCTION TO PHARMACY

Course Code (**PHR117**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

I. Course Identification and General Information:

23.	**Course Title:**	**Introduction To pharmacy**					
24.	**Course Code:**	**PHR117**					
25.	**Credit hours:**	C.H					TOTAL
		L.	Tut.	S.	P.	Tr.	
		2	-	-		-	**2**
26.	**Study level/ semester at which this course is offered:**	*(first) Year – (1st) semester*					
27.	**Pre –requisite (if any):**	**None**					
28.	**Co –requisite (if any):**	**None**					
29.	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**					
30.	**Language of teaching the course:**	**ENGLISH**					
31.	**Location of teaching the course:**	**At THE UNIVERSITY facility**					
32.	**Prepared by**						
33.	**Date of Approval**						

II. Course Description:

The course provides the student with introduction to the profession of pharmacy in the past (History) present and future. The course focuses on different aspects of the profession in these era: including missions of pharmacy, local regional and international foundations of pharmacy, the relation of pharmacists with other health care professionals, types of pharmacy educations and the pharmacy career opportunities.

يزود هذا المقرر الطالب بمقدمة عن مهنة الصيدلة قديماً ,حاضراً ومستقبلاً حيث يركز المقرر على جوانب مختلفة من المهنة في هذه الحقب الثلاث كتعريف المهنة و تغير مهام الصيدلة ، و أنواع المؤسسات المحلية والإقليمية والدولية ذات العلاقة بالصيدلة ، وأنواع التعليم الصيدلاني ، وفرص العمل في الصيدلة وعلاقة الصيادلة بأخصائي الرعاية الصحية الآخرين.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & Understanding: Upon successful completion of the course, students will be able to:		
A10	Describe the pharmacists role in different pharmacy practices.	**a1.** Enumerate the current missions of pharmacy profession and the duties of pharmacists as drug experts.
		a2. Identify the basic pharmacy sciences, academic programs and the foundations that control pharmacy laws
		a3. Discuss the progress of pharmacy throughout history and its current and future development and fields.
		a4. Describe the current carriers of pharmacy profession and the new
Intellectual skills : Upon successful completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify drug risks benefits.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C6	Apply administrative and Pharmacoeconomics rules in pharmacy and ethically use marketing skills for drug promotion.	**c1.** Use the media technologies to communicate, search and present thoughts
Transferable skills : Upon successful completion of the course, students will be able to:		
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d1.** Demonstrate the ability to work effectively within a team.
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d2.** Demonstrate the ability to community and patients serving through understanding of his/her mission as drug experts.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Enumerate the current missions of pharmacy profession and the duties of pharmacists as drug experts.	**Active lecture**	**written exam , assignment**
a2. Identify the basic pharmacy sciences, academic programs and the foundations that control pharmacy laws		
a3 . Discuss the progress of pharmacy throughout history and its current and future development and fields.		
a4. Describe the current carriers of pharmacy profession and the new		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify drug risks benefits.	**Active lecture , feed-back learning**	**written exam , quizzes**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Use the media technologies to communicate, search and present thoughts	**Feed-back learning , Group-project.**	**Assignment, Written- exam**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the ability to work effectively within a team.	**Active lecture**	**Written exam**
d2. Demonstrate the ability to community and patients serving through understanding of his/her mission as drug experts.	**Active lecture**	**Group Assignment**

VI. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Pharmacy and pharmacists**	a1, a2, d2	• definitions (pharmacy, pharmacist, drugs, medications, drug products) • pharmacy motto • Pharmacy profession missions • foundations of pharmacy (world , Asian, Arabic and Yemeni) • Relation of pharmacists with other health care professionals.	2	4
2	**Current pharmacy practices**	a4, a2	• Pharmacy career opportunities (academic, industrial, researcher , developer, hospital, clinical and community pharmacists)	2	4
3	**Education of pharmacy**	a2	• basic pharmacy sciences • academic Baccalaureate programs, higher programs.	1	2
4	**Pharmacists as drug experts**	b1, a1	• drugs benefits • drugs risks • Role of pharmacists as drug experts • sources of information (primary, secondary, tertiary).	1	2
MID-TERM EXAM				1	2
5	**History of pharmacy**	a1	History of pharmacy in: ○ in Sumerian, ○ Egyptian ○ Chinese, Indian, ○ Roman, Greek ○ Arabic and Islamic ○ Western civilization	5	10
6	**Future aspects of pharmacy**	a2, a3	• factors influencing future of pharmacy • current development of pharmacy profession • newer pharmacy disciplines e.g. Complementary and alternative therapy, gene therapy and radiopharmacy	2	4

Course Review	a1, a2, a3, a4, b1,	Review of the course topics by discussion session	1	2

	c1, d1, d2			
FINAL - EXAM			1	2
TOTAL			16	32
Number of Weeks /and Units Per Semester			16	6 units

VII. Teaching strategies of the course:

Active lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VIII. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to do a search-report on one of the newer pharmacy disciplines.	c1,	4-13	6
2	**Group** : each group of students will be assigned to do a search report on one of the famous ancient Muslim Pharmacist	c1, d2	14	4

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
2	Term Works	Quizzes	4-13, 14	10	10 %	b1
		Assignments	7, 12	10	10 %	c1, d2
3	Mid-semester exam of theoretical part (written exam		7	20	20 %	a1, a2, a4, b1, d2, d4
4	Final exam of theoretical part (written exam)		16	60	60 %	a1, a2, a3, a4, b1, c1, d1, d2
			TOTAL	100	100 %	

X. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Lillian M. Azzorpardi . Lecture notes in pharmacy practice, 2010, pharmaceutical press

2- Essential References.

1. Kevin M.G.Taylor. Pharmacy Practice, 2011, Taylor & Francis

3- Electronic Materials and Web Sites *etc*.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3758081/

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

Introduction to Pharmacy

I. Course Identification and General Information:

1.	Course Title:	Introduction To pharmacy					
2.	Course Code:	**PHR117**					
3.	Credit hours:	C.H					TOTAL
		L.	Tut.	S.	P.	Tr.	
		2	-	-		-	**2**
4.	Study level/ semester at which this course is offered:	*(first) Year – (1st) semester*					
5.	Pre –requisite (if any):	None					
6.	Co –requisite (if any):	None					
7.	Program (s) in which the course is offered:	Pharmacy Bachelor					
8.	Language of teaching the course:	ENGLISH					
9.	Location of teaching the course:	At THE UNIVERSITY facility					
10.	Prepared by						
11.	Date of Approval						

II. Course Description:

The course provides the student with introduction to the profession of pharmacy in the past (History) present and future. The course focuses on different aspects of the profession in these era: including missions of pharmacy, local regional and international foundations of pharmacy, the relation of pharmacists with other health care professionals, types of pharmacy educations and the pharmacy career opportunities.

يزود هذا المقرر الطالب بمقدمة عن مهنة الصيدلة قديماً، حاضراً ومستقبلاً حيث يركز المقرر على جوانب مختلفة من المهنة في هذه الحقب الثلاث كتعريف المهنة وتغير مهام الصيدلة، وأنواع المؤسسات المحلية والإقليمية والدولية ذات العلاقة بالصيدلة، وأنواع التعليم الصيدلاني، وفرص العمل في الصيدلة وعلاقة الصيادلة بأخصائي الرعاية الصحية الآخرين.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment of CILOs to PILOs

PILOs		CILOs
Knowledge & Understanding: Upon successful completion of the course, students will be able to:		
A10	Describe the pharmacists role in different pharmacy practices.	**a1.** Enumerate the current missions of pharmacy profession and the duties of pharmacists as drug experts.
		a2. Identify the basic pharmacy sciences, academic programs and the foundations that control pharmacy laws
		a3. Discuss the progress of pharmacy throughout history and its current and future development and fields.
		a4. Describe the current carriers of pharmacy profession and the new
Intellectual skills : Upon successful completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify drug risks benefits.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C6	Apply administrative and Pharmacoeconomics rules in pharmacy and ethically use marketing skills for drug promotion.	**c1.** Use the media technologies to communicate, search and present thoughts
Transferable skills : Upon successful completion of the course, students will be able to:		
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d1.** Demonstrate the ability to work effectively within a team.
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d2.** Demonstrate the ability to community and patients serving through understanding of his/her mission as drug experts.

2. Alignment CILOs to teaching strategies and assessment strategies

(b) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Enumerate the current missions of pharmacy profession and the duties of pharmacists as drug experts.	**Active lecture**	**written exam , assignment**
a2. Identify the basic pharmacy sciences, academic programs and the foundations that control pharmacy laws		
a3 . Discuss the progress of pharmacy throughout history and its current and future development and fields.		
a4. Describe the current carriers of pharmacy profession and the new		
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify drug risks benefits.	**Active lecture , feed-back learning**	**written exam , quizzes**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Use the media technologies to communicate, search and present thoughts	**Feed-back learning , Group-project.**	**Assignment, Written- exam**
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the ability to work effectively within a team.	**Active lecture**	**Written exam**
d2. Demonstrate the ability to community and patients serving through understanding of his/her mission as drug experts.	**Active lecture**	**Group Assignment**

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Pharmacy and pharmacists**	a1, a2, d2	• definitions (pharmacy, pharmacist, drugs, medications, drug products) • pharmacy motto • Pharmacy profession missions • foundations of pharmacy (world, Asian, Arabic and Yemeni) • Relation of pharmacists with other health care professionals.	2	4
2	**Current pharmacy practices**	a4, a2	• Pharmacy career opportunities (academic, industrial, researcher , developer, hospital, clinical and community pharmacists)	2	4
3	**Education of pharmacy**	a2	• basic pharmacy sciences • academic Baccalaureate programs, higher programs.	1	2
4	**Pharmacists as drug experts**	b1, a1	• drugs benefits • drugs risks • Role of pharmacists as drug experts • sources of information (primary, secondary, tertiary).	1	2
MID-TERM EXAM				1	2
5	**History of pharmacy**	a1	History of pharmacy in: ○ in Sumerian, ○ Egyptian ○ Chinese, Indian, ○ Roman, Greek ○ Arabic and Islamic ○ Western civilization	5	10
6	**Future aspects of pharmacy**	a2, a3	• factors influencing future of pharmacy • current development of pharmacy profession • newer pharmacy disciplines e.g. Complementary and alternative therapy, gene therapy and radiopharmacy	2	4

Course Review	a1, a2, a3, a4, b1,	Review of the course topics by discussion session	1	2

	c1, d1, d2			
FINAL - EXAM			1	2
TOTAL			16	32
Number of Weeks /and Units Per Semester			16	6 units

V. Teaching strategies of the course:

Active lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to do a search-report on one of the newer pharmacy disciplines.	c1,	4-13	6
2	**Group** : each group of students will be assigned to do a search report on one of the famous ancient Muslim Pharmacist	c1, d2	14	4

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
2	Term Works	Quizzes	4-13, 14	10	10	b1
		Assignments	7, 12	10	10	c1, d2
3	Mid-semester exam of theoretical part (written exam		7	20	20	a1, a2, a4,b1, d2, d4
4	Final exam of theoretical part (written exam)		16	60	60	a1, a2, a3, a4, b1, c1, d1, d2
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Lillian M. Azzorpardi . Lecture notes in pharmacy practice, 2010, pharmaceutical press

2- Essential References.

1. Kevin M.G.Taylor. Pharmacy Practice, 2011, Taylor & Francis

3- Electronic Materials and Web Sites *etc*.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3758081/

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

MEDICAL PHYSICS

Course Code (**FMS113**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

I. Course Identification and General Information:

34.	Course Title:	Medical Physics					
35.	Course Code:	FMS113					
36.	Credit hours:	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		1	1	-	1	-	**3**
37.	Study level/ semester at which this course is offered:	*(FIRST) Year – (1st) semester*					
38.	Pre –requisite (if any):	None					
39.	Co –requisite (if any):	None					
40.	Program (s) in which the course is offered:	All programs of the faculty of medical sciences					
41.	Language of teaching the course:	ENGLISH					
42.	Location of teaching the course:	At the university facility					
43.	Prepared by						
44.	Date of Approval						

L: lecturing ; Tut: Tutorial , S: seminar ; P: practical ; Tr.: training

II. Course Description:

The course concerns with providing basic knowledge in Physics including kinematics and Newtonian`s laws, work and energy, pressure, electricity, Optical and Sonic physics. The course will link between these basics and their applications in the medical fields. The course will also introduce the students to physics laboratory where they will operate simple physical instruments to measure different physical parameters. The course is also an introduction to specific pharmacy courses including "physical pharmacy" and "pharmaceutics" disciplines.

يهتم المقرر الدراسي بتوفير المعرفة الأساسية في الفيزياء بما في ذلك علم الحركة وقوانين نيوتن، والعمل والطاقة، والضغط، والكهرباء، والفيزياء الضوئية والصوتية، وسيربط بين هذه الأسس العلمية وبين تطبيقاتها في المجالات الطبية. سيتعرف الطلاب أيضا في هذا المقرر على معمل الفيزياء حيث سيعملون على تشغيل أجهزة فيزيائية بسيطة والقيام بقياس بعض من الظواهر الفيزيائية المختلفة. يمثل المقرر أيضًا مدخلا لمقررات تخصصية في الصيدلة مثل "الصيدلة الفيزيائية" و "الصيدلانيات."

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

3. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon co successful completion of the course, students will be able to		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Show understanding of the basics physics concepts associated with motion, electricity, light and sound.
Intellectual skills : Upon co successful completion of the course, students will be able to		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret physical phenomena.
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b2.** Apply equations to calculate physical parameters
Professional and practical skills : Upon co successful completion of the course, students will be able to		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory

Transferable skills: Upon co successful completion of the course, students will be able to		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues and teacher in the laboratory
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

4. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Show understanding of the basics physics concepts associated with motion, electricity, light and sound.	**Active Lecture**	**written exams**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret physical phenomena.	**Active Lecture , Lab practice**	**Written exams, Lab. term works, quizzes, assignments**
b2. Apply equations to calculate physical parameters		

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**Lab. Practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues and teacher in the laboratory	**Lab. Practice**	**Lab. term works, final practical exam**
d2. Demonstrate the skills of time management and self-learning.	**Lab. Practice, feed-back learning**	**Lab. practical works, assignment**
d3. Participate efficiently with his colleagues in a team work.	**Lab. practice, group project**	**Lab. term works, assignment**

VII. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to physics**	a1, b1	• Definition, brief history; relation & applications of physics to modern sciences especially medical sciences	1	2
2	**Kinematics and Newtonian`s laws**	a1, b1, b2	• definition, parameters, Newtonian`s law of motion, factors affecting including force, gravity, mass, etc. • Applications in medical/pharmaceutical sciences. • Exercise Problems	2	4
3	**Work and Energy**	a1, b1, b2	• Definitions • differences between energy, work and Power& Laws governing • Forms and sources of energy (electric, optical, chemical, thermal, etc.) • Applications in medical/pharmaceutical sciences.	3	8
			MID-TERM EXAM	1	2
4	**Pressure**	a1, b1, b2	• Definitions, types • Applications in medical/pharmaceutical sciences. • Exercise Problems	1	
5	**Electricity**	a1, b1, b2	• definition, brief history • electromagnetic field electrical resistance, potential and current • generation techniques • Applications in medical/pharmaceutical sciences. • Exercise Problems	3	6
6	**Optical physics**	a1, b1, b2	• photons, light waves, wave length, wave number, frequency. • Light spectrum (visible, UV, IR, ..,etc.), light absorbance, light refraction, light scattering	2	4

			• Applications in medical/pharmaceutical sciences. • Exercise Problems		
7	**Sonic (sound) physics**	a1, b1, b2	• Sonic waves • ultrasonic waves • Echo • Applications in medical/pharmaceutical sciences. • Exercise Problems	1	2
Course Review		a1, b1, b2	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
22.	Introduction to Physics lab: safety, tools, instruments, scope of experiments and reporting assignments.	**1**	**2**	c1, c2, d1, d2, d3
23.	Determination of gravity acceleration	**1**	**2**	c1, c2, d1, d2, d3
24.	Determination of different forms of Forces	**2**	**2**	c1, c2, d1, d2, d3
25.	Determination of Energy	**2**	**2**	c1, c2, d1, d2, d3
26.	Determination of Pressure	**1**	**2**	c1, c2, d1, d2, d3
27.	measuring of electric current and voltage with different electricity sources.	**2**	**2**	c1, c2, d1, d2, d3
28.	Light spectrum (Prism)	**1**	**2**	c1, c2, d1, d2, d3
29.	Review	**1**	**2**	c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	c1, c2, d1, d2
Total		**12**	**24 equivalent to 12 credit hours**	
Number of Weeks			**12**	

VIII. Teaching strategies of the course:

Active Lecture: It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

IX. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to solve physical problems related to course topics.	b2, d2	4-13	3
2	**Group:** each group of students will be assigned to do a search-based report on one of the physical phenomena in the course topics.	b2, d1, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b2
		Assignments	7, 12	5	5	b2, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, b1
3	Final exam of theoretical part (written exam)		16	50	50	a1, b1, b2
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	c1, c2,d1, d2
			Total	30	30 %	

XI. Learning Resources:

1- Required Textbook(s) (maximum two).
Uwe Krey · Anthony Owen, Basic Theoretical Physics A Concise Overview. 2017, Springer
2- Essential References.
Parkash. An introduction to medical biophysics, 2015
3- Electronic Materials and Web Sites *etc*.
http://www.astrosen.unam.mx/~posgrado/libros/krey_basic_theoretical_physics.pdf

XI.Course Policies:

9.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
10.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
11.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
12.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of **MEDICAL PHYSICS**

I. Course Identification and General Information:

1.	Course Title:	Medical Physics					
2.	Course Code:	FMS113					
3.	Credit hours:	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		1	1	-	1	-	3
4.	Study level/ semester at which this course is offered:	*(FIRST) Year – (1st) semester*					
5.	Pre –requisite (if any):	None					
6.	Co –requisite (if any):	None					
7.	Program (s) in which the course is offered:	All programs of the faculty of medical sciences					
8.	Language of teaching the course:	ENGLISH					
9.	Location of teaching the course:	At the university facility					
10.	Prepared by						
11.	Date of Approval						

II. Course Description:

The course concerns with providing basic knowledge in Physics including kinematics and Newtonian`s laws, work and energy, pressure, electricity, Optical and Sonic physics. The course will link between these basics and their applications in the medical fields. The course will also introduce the students to physics laboratory where they will operate simple physical instruments to measure different physical parameters. The course is also an introduction to specific pharmacy courses including "physical pharmacy" and "pharmaceutics" disciplines.

يهتم المقرر الدراسي بتوفير المعرفة الأساسية في الفيزياء بما في ذلك علم الحركة وقوانين نيوتن، والعمل والطاقة، والضغط، والكهرباء، والفيزياء الضوئية والصوتية، وسيربط بين هذه الأسس العلمية وبين تطبيقاتها في المجالات الطبية. سيتعرف الطلاب أيضا في هذا المقرر على معمل الفيزياء حيث سيعملون على تشغيل أجهزة فيزيائية بسيطة والقيام بقياس بعض من الظواهر الفيزيائية المختلفة. يمثل المقرر أيضًا مدخلا لمقررات تخصصية في الصيدلة مثل "الصيدلة الفيزيائية" و "الصيدلانيات."

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon co successful completion of the course, students will be able to		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Show understanding of the basics physics concepts associated with motion, electricity, light and sound.
Intellectual skills : Upon co successful completion of the course, students will be able to		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret physical phenomena.
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b2.** Apply equations to calculate physical parameters
Professional and practical skills : Upon co successful completion of the course, students will be able to		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory

Transferable skills: Upon co successful completion of the course, students will be able to		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues and teacher in the laboratory
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Show understanding of the basics physics concepts associated with motion, electricity, light and sound.	**Active Lecture**	**written exams**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret physical phenomena.	**Active Lecture , Lab practice**	**Written exams, Lab. term works, quizzes, assignments**
b2. Apply equations to calculate physical parameters		

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**Lab. Practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues and teacher in the laboratory	**Lab. Practice**	**Lab. term works, final practical exam**
d2. Demonstrate the skills of time management and self-learning.	**Lab. Practice works, feed-back learning**	**Lab. practical works, assignment**
d3. Participate efficiently with his colleagues in a team work.	**Lab. practice, group project**	**Lab. term works, assignment**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to physics**	a1, b1	• Definition, brief history; relation & applications of physics to modern sciences especially medical sciences	1	2
2	**Kinematics and Newtonian`s laws**	a1, b1, b2	• definition, parameters, Newtonian`s law of motion, factors affecting including force, gravity, mass, etc. • Applications in medical/pharmaceutical sciences. • Exercise Problems	2	4
3	**Work and Energy**	a1, b1, b2	• Definitions • differences between energy, work and Power& Laws governing • Forms and sources of energy (electric, optical, chemical, thermal, etc.) • Applications in medical/pharmaceutical sciences.	3	8
			MID-TERM EXAM	1	2
4	**Pressure**	a1, b1, b2	• Definitions, types • Applications in medical/pharmaceutical sciences. • Exercise Problems	1	
5	**Electricity**	a1, b1, b2	• definition, brief history • electromagnetic field electrical resistance, potential and current • generation techniques • Applications in medical/pharmaceutical sciences. • Exercise Problems	3	6
6	**Optical physics**	a1, b1, b2	• photons, light waves, wave length, wave number, frequency. • Light spectrum (visible, UV, IR, ..,etc.), light absorbance, light refraction, light scattering	2	4

			• Applications in medical/pharmaceutical sciences. • Exercise Problems		
7	**Sonic (sound) physics**	a1, b1, b2	• Sonic waves • ultrasonic waves • Echo • Applications in medical/pharmaceutical sciences. • Exercise Problems	1	2
Course Review		a1, b1, b2	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	Introduction to Physics lab: safety, tools, instruments, scope of experiments and reporting assignments.	**1**	**2**	c1, c2, d1, d2, d3
2.	Determination of gravity acceleration	**1**	**2**	c1, c2, d1, d2, d3
3.	Determination of different forms of Forces	**2**	**2**	c1, c2, d1, d2, d3
4.	Determination of Energy	**2**	**2**	c1, c2, d1, d2, d3
5.	Determination of Pressure	**1**	**2**	c1, c2, d1, d2, d3
6.	measuring of electric current and voltage with different electricity sources.	**2**	**2**	c1, c2, d1, d2, d3
7.	Light spectrum (Prism)	**1**	**2**	c1, c2, d1, d2, d3
8.	Review	**1**	**2**	c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	c1, c2, d1, d2
Total		**12**	**24 equivalent to 12 credit hours**	
Number of Weeks			**12**	

V. Teaching strategies of the course:

Active Lecture: It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to solve physical problems related to course topics.	b2, d2	4-13	3
2	**Group** : each group of students will be assigned to do a search-based report on one of the physical phenomena in the course topics.	b2, d1, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b2
		Assignments	7, 12	5	5	b2, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, b1
3	Final exam of theoretical part (written exam)		16	50	50	a1, b1, b2
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	c1, c2,d1, d2
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).
Uwe Krey · Anthony Owen, Basic Theoretical Physics A Concise Overview. 2017, Springer
2- Essential References.
Parkash. An introduction to medical biophysics, 2015
3- Electronic Materials and Web Sites *etc*.
http://www.astrosen.unam.mx/~posgrado/libros/krey_basic_theoretical_physics.pdf

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

MEDICAL TERMINOLOGY

Course Code (**FMS118**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

I. Course Identification and General Information:

1	**Course Title:**	**Medical Terminology**				
2	**Course Code &Number:**	**FMS118**				
3	**Credit hours:**	C.H				TOTAL
		L.		Pr	Tr.	
		3		-		3
4	**Study level/ semester at which this course is offered:**	(1ST) year/(1ST) semester				
5	**Pre –requisite:**	None				
6	**Co –requisite :**	AZA116 (English language 1)				
7	**Program (s) in which the course is offered:**	All programs of the faculty				
8	**Language of teaching the course:**	English				
9	**Location of teaching the course:**	At the university facility				
10	**Prepared by**					
11	**Date of Approval**					

II. Course Description:

The focus of this course is on medical and clinical terminology broadly relating to human anatomy and physiology and the basic body systems with added emphasis placed on those terms pertaining to diagnosis and pathology. The bases of medical terms will be examined – such as prefixes, suffixes, roots, combined forms. Pertinent acronyms and abbreviations will also be included

يركز هذا المقرر الدراسي على المصطلحات الطبية والسريرية المتعلقة على نطاق واسع بعلم التشريح وعلم وظائف الأعضاء وأنظمة الجسم الأساسية مع التركيز أيضا على المصطلحات المتعلقة بالتشخيص وعلم الأمراض المرضية سيتناول المقرر أسس المصطلحات الطبية - مثل البادئات واللواحق والجذور والأشكال المركبة كما سيتم تضمين المختصرات والاختصارات ذات الصلة

III. Alignment Course Intended Learning Outcomes (CILOs)to program intended learning outcomes (PILOs) , Teaching Strategies and Assessment Strategies

1. Alignment Course Intended Learning Outcomes (CILOs) to program intended learning outcomes (PILOs)

PILOs	CILO
Knowledge & understanding: Upon successful completion of the course, students will be able to	
A1. Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Identify the principles of basic structures and components of medical terms. **a2**. Explain the origins of medical terms
Intellectual skills : Upon successful completion of the course, students will be able to	
B1. Collect interpret and assess information and data relevant to pharmacy practice	**b1**. Interpret the meanings of medical terms. **b2.** Relate medical terms to the associated parts in the body
B2. Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3.** Classify medical terms according to their prefix, suffix and roots **b4.** Categorize prefix, suffix and roots of medical terms
Professional & practical skills : Upon successful completion of the course, students will be able to	
C6. Apply administrative and Pharmacoeconomics rules in pharmacy and ethically use marketing skills for drug promotion.	**c1**. Use capably medical term in construction articles and reports
Transferable skills : Upon successful completion of the course, students will be able to	
D2. Develop and demonstrate skills of time managements, self-learning and decision making	**d1.** Demonstrate the ability of self-learning

2. Alignment Course Intended Learning Outcomes to Teaching Strategies and Assessment Strategies:

CILO	Teaching strategies	Assessment Strategies
CILOs of knowledge & understanding		
a1. Identify the principles of basic structures and components of medical terms.	Active lecture	Written exam

a2. Explain the origins of medical terms		
CILOs of intellectual skills		
b1. Interpret the meanings of medical terms. **b2.** Relate medical terms to the associated parts in the body **b3.** Classify medical terms according to their prefix, suffix and roots **b4.** Categorize prefix, suffix and roots of medical terms	Active lecture	Written exam , quizzes,
CILOs of practical & professional skills		
c1. Use capably medical term in construction articles and reports	Active lecture	Written exam , assignments
CILOs of general skills		
d1. Demonstrate the ability of self-learning	Feed-back learning	assignments

IV. Course Content:

Order	Units/Topics List	Sub Topics List	No. of Weeks	Contact hours	Learning Outcomes
1	Introduction	▪ Origin of medical terms ▪ Parts of a medical term: prefix, suffix, root	1	2	a1, a2, c1, b3, b4, d1
2	Prefixes	▪ Prefixes related adjectives e.g. numeric (e.g. mono) , size" large and small" (e.g. micro, macro) , dimension "short (e.g. brachy) , speed" slow, fast (e.g. brady, tachy), location (intra, exter, per, ante, post) increased and decreased (e.g. hypo, hyper , mal, olig, a, an), different (e.g. dis, pseud, meta,) , colors	3	6	b1, b2, b3, b4, c1, d1

		(e.g. leuco, erytho) ▪			
3	Suffixes	▪ Suffixes related to science (e.g. -logy, -logist), tests (-scope, -scopy, ----- ▪ -graph, -graphy, , measurement (e.g. -meter), case (-ia, -iasis, -osis,), diseases (e.g.- pathy, -oma, -neoplsm), operations(e.g. –ectomy)	3	6	b1, b2, b3, b4, c1, d1

	Midterm exam		1	2	b1, b2, b3, b4, c1, d1
4	Roots of terms	▪ Roots related to body: ○ cells (e.g. cyte, cyto) tissues(hist), organs (vaso, card) ○ systems and organs ○ pjysio, patho,	5	a1, a2b1, b2, b3, b4, c1, d4	b1, b2, b3, b4, c1, d1
		▪ chemical names (glyc, hydr, chlor, proteo), sciences Multi-roots terms e.g. hyperglycemia	1		b1, b2, b3, b4, c1, d1
5	No suffix or prefix terms	▪ Terms without suffix e.g. erythrocytes ▪ Terms without prefix e.g. cardiology	1		a1, a2, b1, b2, b3, b4, c1, d1
6	Final exam		1	3	b1, b2, b3, b4, c1, d1
Number of Weeks /and Units Per Semester			**16**	**32**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do certain assignments such as summarizing, internet search, make charts or solve mathematical problems related to the courses topics. The teacher will provide them feed-back correction & evaluation

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Construction of an article with 20 medical term (individual assignment)	d1	4-10	10

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b1
		Assignments	7, 12	10	10	c1, d1
2	Mid-semester exam		7	20	20	a1, a2b1, b2, b3, b4, c1
3	Final exam		16	60	60	a1, a2b1, b2, b3, b4, c1
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s)

1. Selva Rose. (1997), Career English for Nurses. Cheiu;ai: OientLongrnanLtd.
2. Quirk, Randolph and JreenbaumSidney(1987). A University Grammar of English, Hong Kong: Longman group (FE) Ltd.

2- Essential References.

1. Thomson A. J. and Maitüiet A. V. (1987). A 1icticl English Grammar, Delhi: Oxford University Press.
2. Gimson A. E. (1986). An Introduction to pronunciation of English. Hong kong: Wing King Tong Ca. Ltd.
3. O' Connor J. D, (1986). Better English h'onuwiation. Cambridge:University Press.

3- Electronic Materials and Web Sites *etc*.

https://www.icslearn.ca/-/media/files/pdf/samplelessons/420-medical-terminology-certificate.pdf?la=en&hash=669A76C04603453951F807895AD6DD2BD231F927

IX. Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** Any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments &Projects:** Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

MEDICAL TERMINOLOGY

I. Course Identification and General Information:

1	**Course Title:**	**Medical Terminology**				
2	**Course Code &Number:**	**FMS118**				
3	**Credit hours:**	C.H				TOTAL
		L.		Pr	Tr.	
		3		-		3
4	**Study level/ semester at which this course is offered:**	(1^{ST}) year/(1^{ST}) semester				
5	**Pre –requisite:**	None				
6	**Co –requisite :**	AZA116 (English language 1)				
7	**Program (s) in which the course is offered:**	All programs offered by the faculty				
8	**Language of teaching the course:**	English				
9	**Location of teaching the course:**	At the university facility				
10	**Prepared by**					
11	**Date of Approval**					

II. Course Description:

The focus of this course is on medical and clinical terminology broadly relating to human anatomy and physiology and the basic body systems with added emphasis placed on those terms pertaining to diagnosis and pathology. The bases of medical terms will be examined – such as prefixes, suffixes, roots, combined forms. Pertinent acronyms and abbreviations will also be included

يركز هذا المقرر الدراسي على المصطلحات الطبية والسريرية المتعلقة على نطاق واسع بعلم التشريح وعلم وظائف الأعضاء وأنظمة الجسم الأساسية مع التركيز أيضا على المصطلحات المتعلقة بالتشخيص و علم الأمراض المرضية سيتناول المقرر أسس المصطلحات الطبية - مثل البادئات واللواحق والجذور والأشكال المركبة كما سيتم تضمين المختصرات والاختصارات ذات الصلة

III. Alignment Course Intended Learning Outcomes (CILOs)to program intended learning outcomes (PILOs) , Teaching Strategies and Assessment Strategies

1. Alignment Course Intended Learning Outcomes (CILOs) to program intended learning outcomes (PILOs)

PILOs	CILO
Knowledge & understanding: Upon successful completion of the course, students will be able to	
A1. Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Identify the principles of basic structures and components of medical terms. **a2**. Explain the origins of medical terms
Intellectual skills : Upon successful completion of the course, students will be able to	
B1. Collect interpret and assess information and data relevant to pharmacy practice	**b1**. Interpret the meanings of medical terms. **b2.** Relate medical terms to the associated parts in the body
B2. Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3.** Classify medical terms according to their prefix, suffix and roots **b4.** Categorize prefix, suffix and roots of medical terms
Professional & practical skills : Upon successful completion of the course, students will be able to	
C6. Apply administrative and Pharmacoeconomics rules in pharmacy and ethically use marketing skills for drug promotion.	**c1**. Use capably medical term in construction articles and reports
Transferable skills : Upon successful completion of the course, students will be able to	
D2. Develop and demonstrate skills of time managements, self-learning and decision making	**d1.** Demonstrate the ability of self-learning

2. Alignment Course Intended Learning Outcomes to Teaching Strategies and Assessment Strategies:		
CILO	Teaching strategies	**Assessment Strategies**
CILOs of knowledge & understanding		
a1. Identify the principles of basic structures and components of medical terms. **a2**. Explain the origins of medical terms	Active lecture	Written exam
CILOs of intellectual skills		
b1. Interpret the meanings of medical terms. **b2.** Relate medical terms to the associated parts in the body **b3.** Classify medical terms according to their prefix, suffix and roots **b4.** Categorize prefix, suffix and roots of medical terms	Active lecture	Written exam , quizzes,
CILOs of practical & professional skills		
c1. Use capably medical term in construction articles and reports	Active lecture	Written exam , assignments
CILOs of general skills		
d1. Demonstrate the ability of self-learning	Feed-back learning	assignments

IV. Course Content:

Order	Units/Topics List	Sub Topics List	No. of Weeks	Contact hours	Learning Outcomes
1	Introduction	▪ Origin of medical terms ▪ Parts of a medical term: prefix, suffix, root	1	2	a1, a2, c1, b3, b4, d1
2	Prefixes	▪ Prefixes related adjectives e.g. numeric (e.g. mono) , size" large and small" (e.g. micro, macro) , dimension "short (e.g. brachy) , speed" slow, fast (e.g. brady, tachy), location (intra, exter, per, ante, post) increased and decreased (e.g. hypo, hyper , mal, olig, a, an), different (e.g. dis, pseud, meta,) , colors (e.g. leuco, erytho) ▪	3	6	b1, b2, b3, b4, c1, d1
3	Suffixes	▪ Suffixes related to science (e.g. -logy, -logist), tests (-scope, -scopy, ----- ▪ -graph, -graphy, , measurement (e.g. -meter), case (-ia, -iasis, -osis,), diseases (e.g.- pathy, -oma, -neoplsm), operations(e.g. –ectomy)	3	6	b1, b2, b3, b4, c1, d1

	Midterm exam		1	2	b1, b2, b3, b4, c1, d1
4	Roots of terms	▪ Roots related to body: ○ cells (e.g. cyte, cyto) tissues(hist), organs (vaso, card) ○ systems and organs ○ pjysio, patho,	5	a1, a2b1, b2, b3, b4, c1, d4	b1, b2, b3, b4, c1, d1
		▪ chemical names (glyc, hydr, chlor, proteo), sciences Multi-roots terms e.g. hyperglycemia	1		b1, b2, b3, b4, c1, d1
5	No suffix or prefix terms	▪ Terms without suffix e.g. erythrocytes ▪ Terms without prefix e.g. cardiology	1		a1, a2, b1, b2, b3, b4, c1, d1
6	Final exam		1	3	b1, b2, b3, b4, c1, d1
Number of Weeks /and Units Per Semester			**16**	**32**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do certain assignments such as summarizing, internet search, make charts or solve mathematical problems related to the courses topics. The teacher will provide them feed-back correction & evaluation

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Construction of an article with 20 medical term (individual assignment)	d1	4-10	10

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b1
		Assignments	7, 12	10	10	c1, d1
2	Mid-semester exam		7	20	20	a1, a2b1, b2, b3, b4, c1
3	Final exam		16	60	60	a1, a2b1, b2, b3, b4, c1
			TOTAL	100	100 %	

IX. X. Learning Resources:

1- Required Textbook(s)

3. Selva Rose. (1997), Career English for Nurses. Cheiu;ai: OientLongrnanLtd.
4. Quirk, Randolph and JreenbaumSidney(1987). A University Grammar of English, Hong Kong: Longman group (FE) Ltd.

2- Essential References.

4. Thomson A. J. and Maitüiet A. V. (1987). A 1icticl English Grammar, Delhi: Oxford University Press.
5. Gimson A. E. (1986). An Introduction to pronunciation of English. Hong kong: Wing King Tong Ca. Ltd.
6. O' Connor J. D, (1986). Better English h'onuwiation. Cambridge:University Press.

3- Electronic Materials and Web Sites *etc*.

https://www.icslearn.ca/-/media/files/pdf/samplelessons/420-medical-terminology-certificate.pdf?la=en&hash=669A76C04603453951F807895AD6DD2BD231F927

XI. Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** Any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments &Projects:** Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

FIRST AID

Course Code (**FMS125**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

I. Course Identification and General Information:

45	**Course Title:**	**FIRST AID**					
46	**Course Code &Number:**	**FMS125**					
47	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	-	-	**2**
48	**Study level/ semester at which this course is offered:**	*(1st) Year – (2nd) semester*					
49	**Pre –requisite (if any):**	**None**					
50	**Co –requisite (if any):**	**None**					
51	**Program (s) in which the course is offered:**	**All BC programs offered by the faculty of medical sciences**					
52	**Language of teaching the course:**	**ENGLISH**					
53	**Location of teaching the course:**	**IN THE UNIVERSITY**					
54	**Prepared by**						
55	**Date of Approval**						

L: lecturing; Tut: Tutorial, S: seminar; P: practical; Tr.: training

II. Course Description:

The course provides the student with basic knowledge about how to provide first aid to people with wounds and burns or who suffer from serious life-threatening conditions such as asphyxia, heart attack, seizures, coma, and others. The course is important to make the student able to act in those events that may occur accidentally while conducting tests in laboratories.

يوفر المقرر للطالب المعرفة الأساسية حول كيفية تقديم الإسعافات الأولية للأشخاص المصابين بالجروح والحروق أو الذين يعانون من ظروف خطيرة تهدد الحياة مثل الاختناق والسكتة القلبية والنوبة العضلية والغيبوبة وغيرها. المقرر هام لتمكين الطالب قادرا على التصرف في حال وقوع تلك الحوادث أثناء اجراء الاختبارات في المعامل.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

5. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Define first aid and its objectives and significance.
		a2. Discuss the principles of first aid in various emergency situations
		a3. Identify the steps to be carried out in first aid of different types of accidents and injuries.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe his/her role as a pharmacist to implement and participate in primary health care and epidemic-diseases control programs and in assisting health care team to provide first aid services.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret signs of mild and sever accidents and injuries.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1 .** Search efficiently for information using documented and electronic sources of information.
		c2. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d2.** Participate efficiently with his colleagues in a team work.

6. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to

Teaching Strategies and Assessment Strategies		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Define first aid and its objectives and significance.	**Active Lecture**	**Written exam s**
a2. Discuss the principles of first aid in various emergency situations		
a3. Identify the steps to be carried out in first aid of different types of accidents and injuries.		
a4. Describe his/her role as a pharmacist to implement and participate in primary health care and epidemic-diseases control programs and in assisting health care team to provide first aid services.		
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret signs of mild and sever accidents and injuries.	**Active Lecture , feed-back learning**	**Written exam , quizzes**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Search efficiently for information using documented and electronic sources of information.	**Group project**	**Assignments**
c2. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the skills of time management and self-learning.	**Group project**	**Assignments**
d2. Participate efficiently with his colleagues in a team work.		

VIII. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to first-aid**	a1, a2, a3, a4	• Definition, concept and history of fist aid • objectives and responsibilities of first aid • role of pharmacist in assisting health care team in providing first-aid to patients. • General principles of first-aid	2	4
2	**First aid of injuries , bleeding, burn , bites**	a1, a2, a3, a4, b1	• Handling of chemicals • First aid of poisoning • First aid of cuts: injuries, bleeding • first-aid of burns & sunburn & frost • first-aid of animal bites, stings • First aid Hit accident	5	10
Mid-term exam				1	2
3	**First aid of conditions affecting, respiratory systems and CVS and CNS**	a1, a2, a3, a4, b1	• First aid of asphyxia • first aid of hypotension & shock • first aid of cardiac arrest • First aid of seizure • First aid of coma	7	14
Course Review		a1, a2, a3, a4, b1	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	3 Units

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

X. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
2	**Group** : each group of students will be assigned to provide a search-based report for comparison of first-aid procedures of cases not included in the theoretical part of the course.	c1, c2 , d1, d2	14	10

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b1
		Assignments	7, 12	10	10	c1, c2, d1, d2
2	Mid-semester exam		7	20	20	a1, a2, a3, a4, b1
3	Final exam		16	60	60	a1, a2, a3, a4, b1
			TOTAL	100	100 %	

XII. Learning Resources:

1- Required Textbook(s) (maximum two).
Textbook on First Aid and Emergency Nursing, 2013, Jaypee Brothers Medical Publishers
2- Essential References.
Nigel Barraclough . First Aid Made Easy. A Comprehensive First Aid Manual and Reference Guide, 2006, First On Scene Training.
3- Electronic Materials and Web Sites *etc*.
http://www.gputtawar.edu.in/downloads/first-aid.pdf

XII. Course Policies:

13.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
14.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
15.	**Exam Attendance/Punctuality:** Any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
16.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of **FIRST AID**

I. Course Identification and General Information:

1.	Course Title:	FIRST AID					
2.	Course Code &Number:	FMS125					
3.	Credit hours:	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	-	-	**2**
4.	Study level/ semester at which this course is offered:	*(1st) Year – (2nd) semester*					
5.	Pre –requisite (if any):	None					
6.	Co –requisite (if any):	None					
7.	Program (s) in which the course is offered:	All BC programs offered by the faculty of medical sciences					
8.	Language of teaching the course:	ENGLISH					
9.	Location of teaching the course:	IN THE UNIVERSITY					
10	Prepared by						
11	Date of Approval						

II. Course Description:

The course provides the student with basic knowledge about how to provide first aid to people with wounds and burns or who suffer from serious life-threatening conditions such as asphyxia, heart attack, seizures, coma, and others. The course is important to make the student able to act in those events that may occur accidentally while conducting tests in laboratories.

يوفر المقرر للطالب المعرفة الأساسية حول كيفية تقديم الإسعافات الأولية للأشخاص المصابين بالجروح والحروق أو الذين يعانون من ظروف خطيرة تهدد الحياة مثل الاختناق والسكتة القلبية والنوبة العضلية والغيبوبة وغيرها. المقرر هام لتمكين الطالب قادرا على التصرف في حال وقوع تلك الحوادث أثناء اجراء الاختبارات في المعامل.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Define first aid and its objectives and significance.
		a2. Discuss the principles of first aid in various emergency situations
		a3. Identify the steps to be carried out in first aid of different types of accidents and injuries.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe his/her role as a pharmacist to implement and participate in primary health care and epidemic-diseases control programs and in assisting health care team to provide first aid services.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret signs of mild and sever accidents and injuries.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1.** Search efficiently for information using documented and electronic sources of information.
		c2. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d2.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to

Teaching Strategies and Assessment Strategies		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Define first aid and its objectives and significance.	**Active Lecture**	**Written exam s**
a2. Discuss the principles of first aid in various emergency situations		
a3. Identify the steps to be carried out in first aid of different types of accidents and injuries.		
a4. Describe his/her role as a pharmacist to implement and participate in primary health care and epidemic-diseases control programs and in assisting health care team to provide first aid services.		
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret signs of mild and sever accidents and injuries.	**Active Lecture , feed-back learning**	**Written exam , quizzes**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Search efficiently for information using documented and electronic sources of information.	**Group project**	**Assignments**
c2. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the skills of time management and self-learning.	**Group project**	**Assignments**
d2. Participate efficiently with his colleagues in a team work.		

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to first-aid**	a1, a2, a3, a4	• Definition, concept and history of fist aid • objectives and responsibilities of first aid • role of pharmacist in assisting health care team in providing first-aid to patients. • General principles of first-aid	2	4
2	**First aid of injuries , bleeding, burn , bites**	a1, a2, a3, a4, b1	• Handling of chemicals • First aid of poisoning • First aid of cuts: injuries, bleeding • first-aid of burns & sunburn & frost • first-aid of animal bites, stings • First aid Hit accident	5	10
Mid-term exam				1	2
3	**First aid of conditions affecting, respiratory systems and CVS and CNS**	a1, a2, a3, a4, b1	• First aid of asphyxia • first aid of hypotension & shock • first aid of cardiac arrest • First aid of seizure • First aid of coma	7	14
Course Review		a1, a2, a3, a4, b1	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	3 Units

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
2	**Group** : each group of students will be assigned to provide a search-based report for comparison of first-aid procedures of cases not included in the theoretical part of the course.	c1, c2 , d1, d2	14	10

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b1
		Assignments	7, 12	10	10	c1, c2, d1, d2
2	Mid-semester exam		7	20	20	a1, a2, a3, a4, b1
3	Final exam		16	60	60	a1, a2, a3, a4, b1
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).
Textbook on First Aid and Emergency Nursing, 2013, Jaypee Brothers Medical Publishers
2- Essential References.
Nigel Barraclough . First Aid Made Easy. A Comprehensive First Aid Manual and Reference Guide, 2006, First On Scene Training.
3- Electronic Materials and Web Sites *etc*.
http://www.gputtawar.edu.in/downloads/first-aid.pdf

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** Any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

MATHEMATICS

Course Code (**PHR127**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

I. Course Identification and General Information:

56.	**Course Title:**	**Mathematics**					
57.	**Course Code:**	**PHR127**					
58.	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tr.	P.			
		2	-	-	-	-	**2**
59.	**Study level/ semester at which this course is offered:**	*(FIRST) Year – (2ND) semester*					
60.	**Pre –requisite (if any):**	**NONE**					
61.	**Co –requisite (if any):**	PHR126 (Pharmaceutical Calculations)					
62.	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**					
63.	**Language of teaching the course:**	**ENGLISH**					
64.	**Location of teaching the course:**	**At the university facility**					
65.	**Prepared by**						
66.	**Date of Approval**						

L: lecturing; Tut: Tutorial, S: seminar; P: practical; Tr.: training

III. Course Description:

The course of "Mathematics" is designed to provide the student with basic mathematical knowledge and skills including rectangular Co-ordinates, curve fitting using first-degree equation in both variables, determination of slope and intercept and point of intersection, equation of first degree in both x and y , exponential and logarithmic curves, graphical solution of equation, graphical solution of simultaneous equations, arithmetic progression, geometric progression, permutation-combination, binomial theorem, exponential theorem. These knowledge and skills will help the student to solve mathematical problems encountered in during pharmaceutical, analytical and pharmacokinetics. The course is co-requested with "Pharmaceutical calculations" course as both concern with skills of solving mathematical problems and skills.

تم تصميم مقرر"الرياضيات" لتزويد الطالب بالمعرفة والمهارات الرياضية الأساسية بما في ذلك الإحداثيات المستطيلة، وتركيب المنحنى باستخدام معادلة الدرجة الأولى في كلا المتغيرين، وتحديد المنحدر والتقاطع ونقطة التقاطع، والمنحنيات الأسية واللوغاريتمية، الحل الرسومي للمعادلات. ستساعد هذه المعرفة والمهارات الطالب على حل المسائل الرياضية التي تستخدم لحساب حركية الدواء والقيام بالحسابات التحليلية والصيدلانية. يتم أخذ هذا المقرر بالتزامن مع مقرر " الحسابات الصيدلانية" حيث يهتم كلاهما بمهارات حل المسائل المعادلات الرياضية .

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

7. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and Understanding: Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Discuss the basic mathematical principles commonly encountered during his/her pharmacy study and at practicing the profession.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the linearity and other graphical parameters.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c1.** Operate and use scientific calculator correctly.
Transferable skills : Upon successful completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the ability of time management, self-learning and problem-solving skills
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d2.** Work successfully in team-work.

8. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Discuss the basic mathematical principles commonly encountered during his/her pharmacy study and at practicing the profession	**Active Lecture, feed-back learning,**	**written exam**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret the linearity and other graphical parameters.	**feed-back learning, Group-project.**	**Written exam**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Operate and use scientific calculator correctly.	**Active Lecture**	**Written exam**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the ability of time management, self-learning and problem-solving skills	**Active Lecture**	**Quiz**
d2. Work successfully in team-work.	**Active Lecture**	**Assignment**

IX. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Graphs and Gradients**	a1, b1, , c1,	• Rectangular Co-ordinates. Curve fitting using first-degree equation in both variables. • Determination of slope and intercept and point of intersection • Equation of first degree in both x and y (circle, ellipse, rectangular hyperbola etc. • Exponential and logarithmic curves, graphical solution of equation, graphical solution of • simultaneous equations • Arithmetic progression, geometric progression, permutation-combination, binomial theorem, exponential theorem • Application of curve fitting method in expressing degradation of drugs	6	12
MID-TERM EXAM				1	2
2	**Calculus**	a1, c1	• Rate process, rules of differentiation, successive and partial differentiation, differentiation of a function, relation between the derivatives of inverse functions • Rules of integration, integration as a summation, area under curve, integration by partial fraction, graphical integration, indefinite and definite integrals.	3	6
3	**Matrices**	a1, c1	• Addition. Subtraction and multiplication of matrices • unit matrix, row transformation, determinants, inverse of matrix and solution of equations by matrix	4	8
Course Review		a1, c1	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	3 Units

IX. Teaching strategies of the course:

Active lecture - Discussion: a short lecture/ address followed by discussion

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to solve mathematical problems during Tutorial at the class .	a1, c1, d2	4-13	6
2	**Group** : each group of students will be assigned to solve mathematical problems during as homework	a1, c1, d1	14	4

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
2	Term Works	Quizzes	4-13, 14	10	10	c1,
		Assignments	7, 12	10	10	a1, c1, d1, d2
3	Mid-semester exam (written exam)		7	20	20	a1, b1, c1
4	Final exam (written exam)		16	60	60	a1, c1
		TOTAL		100	100 %	

XIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Rupinder Sekhon. Applied Finite Mathematics,2012, OpenStax CNX

2- Essential References.

2. Indra K. Reddy Mansoor a. khan, Essential Math and calculations for pharmacy, 2014, CRC Press
3. Shahidulla , Bhattacharjee : A text book on Coordinate Geometry and Vector Analysis,2014,

3- Electronic Materials and Web Sites *etc*.

https://open.umn.edu/opentextbooks/formats/481

XIII. Course Policies:

17.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
18.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
19.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
20.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of **MATHEMATICS**

I. Course Identification and General Information:

1.	**Course Title:**	**Mathematics**					
2.	**Course Code:**	**PHR127**					
3.	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tr.	P.			
		2	-	-	-	-	**2**
4.	**Study level/ semester at which this course is offered:**	*(FIRST) Year – (2ND) semester*					
5.	**Pre –requisite (if any):**	**NONE**					
6.	**Co –requisite (if any):**	PHR126 (Pharmaceutical Calculations)					
7.	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**					
8.	**Language of teaching the course:**	**ENGLISH**					
9.	**Location of teaching the course:**	**At the university facility**					
10.	**Prepared by**						
11.	**Date of Approval**						

II. Course Description:

The course of "Mathematics" is designed to provide the student with basic mathematical knowledge and skills including rectangular Co-ordinates, curve fitting using first-degree equation in both variables, determination of slope and intercept and point of intersection, equation of first degree in both x and y , exponential and logarithmic curves, graphical solution of equation, graphical solution of simultaneous equations, arithmetic progression, geometric progression, permutation-combination, binomial theorem, exponential theorem. These knowledge and skills will help the student to solve mathematical problems encountered in during pharmaceutical, analytical and pharmacokinetics. The course is co-requested with "Pharmaceutical calculations" course as both concern with skills of solving mathematical problems and skills.

تم تصميم مقرر"الرياضيات" لتزويد الطالب بالمعرفة والمهارات الرياضية الأساسية بما في ذلك الإحداثيات المستطيلة، وتركيب المنحنى باستخدام معادلة الدرجة الأولى في كلا المتغيرين، وتحديد المنحدر والتقاطع ونقطة التقاطع، والمنحنيات الأسية واللوغاريتمية، الحل الرسومي للمعادلات. ستساعد هذه المعرفة والمهارات الطالب على حل المسائل الرياضية التي تستخدم لحساب حركية الدواء والقيام بالحسابات التحليلية والصيدلانية. يتم أخذ هذا المقرر بالتزامن مع مقرر " الحسابات الصيدلانية" حيث يهتم كلاهما بمهارات حل المسائل المعادلات الرياضية .

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and Understanding: Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Discuss the basic mathematical principles commonly encountered during his/her pharmacy study and at practicing the profession.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the linearity and other graphical parameters.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c1.** Operate and use scientific calculator correctly.
Transferable skills : Upon successful completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the ability of time management, self-learning and problem-solving skills
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d2.** Work successfully in team-work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to

Teaching Strategies and Assessment Strategies		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Discuss the basic mathematical principles commonly encountered during his/her pharmacy study and at practicing the profession	**Active Lecture, feed-back learning,**	**written exam**
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret the linearity and other graphical parameters.	**feed-back learning, Group-project.**	**Written exam**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Operate and use scientific calculator correctly.	**Active Lecture**	**Written exam**
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the ability of time management, self-learning and problem-solving skills	**Active Lecture**	**Quiz**
d2. Work successfully in team-work.	**Active Lecture**	**Assignment**

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Graphs and Gradients**	a1, b1, , c1,	• Rectangular Co-ordinates. Curve fitting using first-degree equation in both variables. • Determination of slope and intercept and point of intersection • Equation of first degree in both x and y (circle, ellipse, rectangular hyperbola etc. • Exponential and logarithmic curves, graphical solution of equation, graphical solution of • simultaneous equations • Arithmetic progression, geometric progression, permutation-combination, binomial theorem, exponential theorem • Application of curve fitting method in expressing degradation of drugs	6	12
MID-TERM EXAM				1	2
2	**Calculus**	a1, c1	• Rate process, rules of differentiation, successive and partial differentiation, differentiation of a function, relation between the derivatives of inverse functions • Rules of integration, integration as a summation, area under curve, integration by partial fraction, graphical integration, indefinite and definite integrals.	3	6
3	**Matrices**	a1, c1	• Addition. Subtraction and multiplication of matrices • unit matrix, row transformation, determinants, inverse of matrix and solution of equations by matrix	4	8
Course Review		a1, c1	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	3 Units

V. Teaching strategies of the course:

Active lecture - Discussion: a short lecture/ address followed by discussion

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to solve mathematical problems during Tutorial at the class .	a1, c1, d2	4-13	6
2	**Group** : each group of students will be assigned to solve mathematical problems during as homework	a1, c1, d1	14	4

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
2	Term Works	Quizzes	4-13, 14	10	10	c1,
		Assignments	7, 12	10	10	a1, c1, d1, d2
3	Mid-semester exam (written exam)		7	20	20	a1, b1, c1
4	Final exam (written exam)		16	60	60	a1, c1
		TOTAL		100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Rupinder Sekhon. Applied Finite Mathematics,2012, OpenStax CNX

2- Essential References.

4. Indra K. Reddy Mansoor a. khan, Essential Math and calculations for pharmacy, 2014, CRC Press
5. Shahidulla , Bhattacharjee : A text book on Coordinate Geometry and Vector Analysis,2014,

3- Electronic Materials and Web Sites *etc*.

https://open.umn.edu/opentextbooks/formats/481

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PHARMACEUTICAL CALCULATIONS

Course Code (**PHR126**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

III. Course Identification and General Information:

67	**Course Title:**	**PHARMACEUTICAL CALCULATIONS**					
68	**Course Code &Number:**	**PHR126**					
69	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		1	1	-	-	-	**2**
70	**Study level/ semester at which this course is offered:**	*(first) Year – (2nd) semester*					
71	**Pre –requisite (if any):**	**None**					
72	**Co –requisite (if any):**	PHR127 **(Mathematics)**					
73	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**					
74	**Language of teaching the course:**	**ENGLISH**					
75	**Location of teaching the course:**	**At the university facility**					
76	**Prepared by**						
77	**Date of Approval**						

L: lecturing; Tut: Tutorial, S: seminar; P: practical; Tr.: training

IV. Course Description:

The course provides the student with basic knowledge and skills of pharmaceutical calculations including: how to express and convert numerals (Arabic and Roman), measurement of weight and volume systems (American, British and French) and interconversion between these systems, how to interpret and quantify compounded prescriptions. The knowledge and skills are significant during medication`s formulation, dispensing, dosing and others missions of pharmacy practice.

يزود المقرر الطالب بالمعرفة والمهارات الأساسية للحسابات الصيدلانية ومنها كيفية التعبير عن الأرقام وتحويلها (العربية والرومانية) وأنظمة قياس الوزن وأنظمة قياس الحجم (الأمريكية والبريطانية والفرنسية) والتحويل بين هذه الأنظمة وكيفية التحويل بين أنظمة التراكيز كيفية تفسير الوصفات الطبية المركبة. تعتبر هذه المعارف والمهارات ذات أهمية قصوى أثناء صياغة الأدوية، وصرفها، وتحديد الجرعات وغيرها من مهام ممارسة الصيدلة.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

9. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A11	Identify the properties of dosage forms and novel drug delivery systems.	**a1.** Describe the methods of pharmaceutical calculations.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret abbreviations employed in pharmaceutical prescriptions.
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b2.** Apply pharmaceutical calculations in preparation of medications and dispensing of prescriptions
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c1.** Operate calculator correctly during formulation of pharmaceutical preparations
Transferable skills : Upon successful completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the skill of time management and self-learning
D3.	Participate collaboratively in team work with colleagues and healthcare professionals.	**d2.** Participate efficiently with his colleagues in a team work.

10. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Describe the methods of pharmaceutical calculations.	**Active Lecture**	**Written exam**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret abbreviations employed in pharmaceutical prescriptions.	**Active Lecture, feed-back learning**	**Written exam , quizzes,**
b2. Apply pharmaceutical calculations in preparation of medications and dispensing of prescriptions	**Active Lecture, feed-back learning**	**Written exam , quizzes, assignment**

(c) Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Operate calculator correctly during formulation of pharmaceutical preparations	**Active Lecture , Feed-back learning**	**written exam , Quizzes**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the skill of time management and self-learning	**Feed-back learning**	**Assignment**
d2. Participate efficiently with his colleagues in a team work.	**Group-project**	**assignment**

X. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1	basic mathematical processing, calculators , source of errors, Roman and Arabic Numerals	1	2
2	**Pharmaceutical measurement systems of weights**	a1, b2,c1	: • Apothecary and avoird. systems • metric system. • Equivalent weight and milliequivalent weight	2	4
3	**Pharmaceutical measurement systems of volumes**	a1, b2, c1	• Apothecary • Metric system • house-hold systems	2	4
4	**Expressions of concentrations**	a1, b2,c1	percentage, ratio, quantity/quantity, PPM, PPB, molarity	1	2
5	**Dilution &Allegation**	a1, b2,c1	• Dilution of conc. Solutions • dilution of potent solids	1	2
MID-TERM EXAM				1	2
6	**Isotonicity**	a1, b2,c1	• definition & significance • determination	1	2
7	**Buffer capacity**	a1, b2,c1	• definition & significance • determination	1	2
8	**Medical prescriptions**	a1,b1, b2,c1	• ideal prescription, • components of the prescriptions • common symbols and abbreviations	2	4
9	**Enlarging and reducing prescription**	a1,b1, b2,c1	• definition • determination	1	2

	formulas				
10	**Pediatric Dose**	a1,b1, b2,c1	• definitions of doses • Expression of doses • Rules for calculation the child`s dose based on age, weight and body surface area	2	4
Course Review			Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	10 Units

X. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XII. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: the teacher provides the students with mathematical problems after each unit. Every student is assigned to solve some of those problems individually.	b2, d2	4-13	6
2	**Group:** each group of students will be assigned to present a report of typical answers of problems of one unit with assessing the correction of answers.	b2, d1, d3	14	4

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
2	Term Works	Quizzes	4-13, 14	10	10	c1, b1
		Assignments	7, 12	10	10	d1, d2, d3, b2
3	Mid-semester exam		7	20	20	a1, b2, c1
4	Final exam		16	60	60	a1, b1, b2, c1
			TOTAL	100	100 %	

XIV. Learning Resources:

1- Required Textbook(s) (maximum two).

6. Howard C. Ansel, Pharmaceutical Calculations, 2013, Lippincott Williams & Wilkins .

2- Essential References.

Ryan F Donnelly, Johanne Barry, MCQs in Pharmaceutical Calculations, 2016, pharmaceutical press

3- Electronic Materials and Web Sites *etc*.

https://4lmppguhpp.pdcdn1.top/dl2.php?id=21670075&h=9d6cc5f1a85c7164d6784613a3591bcc&u=cache&ext=pdf&n=Mcqs%20in%20pharmaceutical%20calculations

XIV. Course Policies:

21.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
22.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
23.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
24.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

PHARMACEUTICAL CALCULATIONS

I. Course Identification and General Information:

1.	**Course Title:**	**PHARMACEUTICAL CALCULATIONS**					
2.	**Course Code &Number:**	**PHR126**					
3.	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		1	1	-	-	-	**2**
4.	**Study level/ semester at which this course is offered:**	*(first) Year – (2nd) semester*					
5.	**Pre –requisite (if any):**	**None**					
6.	**Co –requisite (if any):**	PHR127 **(Mathematics)**					
7.	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**					
8.	**Language of teaching the course:**	**ENGLISH**					
9.	**Location of teaching the course:**	**At the university facility**					
10	**Prepared by**						
11	**Date of Approval**						

II. Course Description:

The course provides the student with basic knowledge and skills of pharmaceutical calculations including: how to express and convert numerals (Arabic and Roman), measurement of weight and volume systems (American, British and French) and interconversion between these systems, how to interpret and quantify compounded prescriptions. The knowledge and skills are significant during medication`s formulation, dispensing, dosing and others missions of pharmacy practice.

يزود المقرر الطالب بالمعرفة والمهارات الأساسية للحسابات الصيدلانية ومنها كيفية التعبير عن الأرقام وتحويلها (العربية والرومانية) وأنظمة قياس الوزن وأنظمة قياس الحجم (الأمريكية والبريطانية والفرنسية) والتحويل بين هذه الأنظمة وكيفية التحويل بين أنظمة التراكيز كيفية تفسير الوصفات الطبية المركبة. تعتبر هذه المعارف والمهارات ذات أهمية قصوى أثناء صياغة الأدوية، وصرفها، وتحديد الجرعات وغيرها من مهام ممارسة الصيدلة.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A11	Identify the properties of dosage forms and novel drug delivery systems.	**a1.** Describe the methods of pharmaceutical calculations.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret abbreviations employed in pharmaceutical prescriptions.
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b2.** Apply pharmaceutical calculations in preparation of medications and dispensing of prescriptions
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c1.** Operate calculator correctly during formulation of pharmaceutical preparations
Transferable skills : Upon successful completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the skill of time management and self-learning
D3.	Participate collaboratively in team work with colleagues and healthcare professionals.	**d2.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Describe the methods of pharmaceutical calculations.	**Active Lecture**	**Written exam**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret abbreviations employed in pharmaceutical prescriptions.	**Active Lecture, feed-back learning**	**Written exam , quizzes,**
b2. Apply pharmaceutical calculations in preparation of medications and dispensing of prescriptions	**Active Lecture, feed-back learning**	**Written exam , quizzes, assignment**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Operate calculator correctly during formulation of pharmaceutical preparations	**Active Lecture , Feed-back learning**	**written exam , Quizzes**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the skill of time management and self-learning	**Feed-back learning**	**Assignment**
d2. Participate efficiently with his colleagues in a team work.	**Group-project**	**assignment**

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1	basic mathematical processing, calculators , source of errors, Roman and Arabic Numerals	1	2
2	**Pharmaceutical measurement systems of weights**	a1, b2,c1	: • Apothecary and avoird. systems • metric system. • Equivalent weight and milliequivalent weight	2	4
3	**Pharmaceutical measurement systems of volumes**	a1, b2, c1	• Apothecary • Metric system • house-hold systems	2	4
4	**Expressions of concentrations**	a1, b2,c1	percentage, ratio, quantity/quantity, PPM, PPB, molarity	1	2
5	**Dilution &Allegation**	a1, b2,c1	• Dilution of conc. Solutions • dilution of potent solids	1	2
MID-TERM EXAM				1	2
6	**Isotonicity**	a1, b2,c1	• definition & significance • determination	1	2
7	**Buffer capacity**	a1, b2,c1	• definition & significance • determination	1	2
8	**Medical prescriptions**	a1,b1, b2,c1	• ideal prescription, • components of the prescriptions • common symbols and abbreviations	2	4
9	**Enlarging and reducing prescription**	a1,b1, b2,c1	• definition • determination	1	2

	formulas				
10	**Pediatric Dose**	a1,b1, b2,c1	• definitions of doses • Expression of doses • Rules for calculation the child`s dose based on age, weight and body surface area	2	4
Course Review			Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	10 Units

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: the teacher provides the students with mathematical problems after each unit. Every student is assigned to solve some of those problems individually.	b2, d2	4-13	6
2	**Group:** each group of students will be assigned to present a report of typical answers of problems of one unit with assessing the correction of answers.	b2, d1, d3	14	4

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
2	Term Works	Quizzes	4-13, 14	10	10	c1, b1
		Assignments	7, 12	10	10	d1, d2, d3, b2
3	Mid-semester exam		7	20	20	a1, b2, c1
4	Final exam		16	60	60	a1, b1, b2, c1
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Howard C. Ansel, Pharmaceutical Calculations, 2013, Lippincott Williams & Wilkins .

2- Essential References.

Ryan F Donnelly, Johanne Barry, MCQs in Pharmaceutical Calculations, 2016, pharmaceutical press

3- Electronic Materials and Web Sites *etc*.

https://4lmppguhpp.pdcdn1.top/dl2.php?id=21670075&h=9d6cc5f1a85c7164d6784613a3591bcc&u=cache&ext=pdf&n=Mcqs%20in%20pharmaceutical%20calculations

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PSYCHOLOGY

Course Code (**FMS124**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

V. Course Identification and General Information:

78	**Course Title:**	**PSYCHOLOGY**					
79	**Course Code &Number:**	**FMS124**					
80	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	-	-	**2**
81	**Study level/ semester at which this course is offered:**	*(first) Year – 1ST) semester*					
82	**Pre –requisite (if any):**	**NONE**					
83	**Co –requisite (if any):**	**NONE**					
84	**Program (s) in which the course is offered:**	**All BC programs offered by the faculty**					
85	**Language of teaching the course:**	**ENGLISH**					
86	**Location of teaching the course:**	**At the university facility**					
87	**Prepared by**						
88	**Date of Approval**						

L: lecturing; Tut: Tutorial, S: seminar; P: practical; Tr.: training

VI. Course Description:

The course provides the student with knowledge in basic psychology concepts in particular the human personality in terms of their types, affecting factors, methods of assessment and communication. Also, the course concerns with medical psychology including psychological health and states of fear, anxiety and depression associated with human diseases, this knowledge will the help the pharmacist to deal effectively with patients and with colleague healthcare professionals.

يزود المقرر الطالب بالمعرفة في مفاهيم علم النفس الأساسية وخاصة الشخصية البشرية من حيث أنواعها، والعوامل المؤثرة عليها، وطرق تقييمها والتواصل معها. أيضًا ، يهتم المقرر بعلم النفس الطبي بما في ذلك الصحة النفسية وحالات الخوف والقلق والاكتئاب المرتبطة بالأمراض البشرية ، وستساعد هذه المعرفة الصيدلي على التعامل بفعالية مع المرضى ومع زملائه المتخصصين في الرعاية الصحية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

11. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & Understanding: Upon successful completion of the course, students will be able to **:**		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Identify the schools of psychology and the role of psychology in management of modern diseases
		a2. Define the essential psychological concepts such as mental ability, motives and emotions
		a3. Determine the basic human psychological needs and the emotional needs of ill people.
		a4. Describe various types of personalities and how to deal with each type.
A3	Explain physicochemical properties of materials and products	**a4**. Discuss the stages in development of human personality.
A4	Describe analytical methods, principles, design and development techniques	**a5.** Describe the role of pharmacists as health care professional in dealing with various personalities of patients and grasp their emotional needs.
Intellectual skills : Upon successful completion of the course, students will be able to **:**		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Compare between psychiatry, behavior medicine and psychology
		b2. Classify personalities of human into various categories.
		b3. Differentiate between psychopathic and normal persons.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis	**b4.** Assess the emotional needs of patients. select
Professional & practical skills : Upon successful completion of the course, students will be able to **:**		
C7	Conduct research and utilize the results in different pharmaceutical fields	**c1.** Present his/her thoughts , search for information and report works effectively using language.

Transferable skills : Upon successful completion of the course, students will be able to **:**		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively with patients.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Share successfully in team-work.

12. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the schools of psychology and the role of psychology in management of modern diseases	**Active Lecture, feed-back learning**	**written exam , assignment**
a2. Define the essential psychological concepts such as mental ability, motives and emotions		
a3. Determine the basic human psychological needs and the emotional needs of ill people.		
a4. Discuss the stages in development of human personality.	**Active Lecture**	**written exam**
a5. Describe the role of pharmacists as health care professional in dealing with various personalities of patients and grasp their emotional needs.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Compare between psychiatry, behavior medicine and psychology	**Active Lecture ,Feed-back learning**	**Written exam , assignment, quiz**
b2. Classify personalities of human into various categories.		
b3. Differentiate between psychopathic and normal persons.		
b4 . Assess the emotional needs of patients. select		

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Present his/her thoughts , search for information and report works effectively using language	**Feed-back learning, Group-project.**	**assignments**
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively with patients.	**Group-project, feed-back learning**	**Assignment, Written exam , assignment**
d2. Demonstrate skills of time management and self-learning.		
d3. Share successfully in team-work.		

XI. Course Content:

No	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to psychology**	a1	• Definition, historical progress • Purposes of psychology • schools of psychology.	2	4
2	**Human needs and drives**	a3	• Basic human needs and biological or primary drives, Secondary social and psychological drives.	2	4
3	**Psychology concepts**	a2	• Mental ability, Motor skills, motives • Sensation , Conceit , emotion	2	4
MID-TERM EXAM				1	2
4	**Personality**	a4, a5, b2, b3, b4, d2	• Definition and dimensional types • Growth and environment factors • Relationship between achievement of development stages goals and basic structure of personality. • Types of personalities • Methods of assessment • Dealing and communication with various types of personalities • Differences between psychopathic and normal persons.	4	8
5	**Medical psychology**	b1, d2	• Fear, anxiety and depression associated with Illness. • Emotional needs of ill persons • Psychological health and behavioral Medicine. • Psychiatry	3	6
Course Review		a1, a2, a3, a4,a5, b2, b3, b4, d2	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	Units

XI. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XIII. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to do a search-based report on one of the subtopics studies such as : psychology schools and concepts.	a1, b1, b2, b3, c1	4-13	6
2	**Group:** each group of students will be assigned to do a search report on how to deal with one of the following: • Mentally disables • Nervous personalities • Depressed patients • Self-proud persons	c1, d1, d2, d3	14	4

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method	Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Assignments	4-13, 14	10	10	a1, b1, b2, b3, c1, d1, d2, d3
2	Quizzes	7, 12	10	10	b1, b2, b3
3	Mid-semester (written exam)	7	20	20	a1, a2, a3
4	Final exam (written exam)	17	60	60	a1, a2, a3, b1, b2, b3, b4, d2
TOTAL			100	100 %	100

XV. Learning Resources:

1- Required Textbook(s) (maximum two).

Robert Bissau-Diener. Psychology as a Social Science, 2015, Noba

2- Essential References.

Tori Kearns. General Psychology: An Introduction. 2015, University System of Georgia

3- Electronic Materials and Web Sites *etc*.

1- https://nobaproject.com/textbooks/together-the-science-of-social-psychology
2- https://oer.galileo.usg.edu/cgi/viewcontent.cgi?article=1000&context=psychology-textbooks

XV. Course Policies:	
25.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
26.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
27.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
28.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of **PSYCHOLOGY**

I. Course Identification and General Information:

1.	Course Title:	PSYCHOLOGY					
2.	Course Code &Number:	FMS124					
3.	Credit hours:	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	-	-	**2**
4.	Study level/ semester at which this course is offered:	*(first) Year – 1ST) semester*					
5.	Pre –requisite (if any):	NONE					
6.	Co –requisite (if any):	NONE					
7.	Program (s) in which the course is offered:	All BC programs offered by the faculty					
8.	Language of teaching the course:	ENGLISH					
9.	Location of teaching the course:	At the university facility					
10	Prepared by						
11	Date of Approval						

II. Course Description:

The course provides the student with knowledge in basic psychology concepts in particular the human personality in terms of their types, affecting factors, methods of assessment and communication. Also, the course concerns with medical psychology including psychological health and states of fear, anxiety and depression associated with human diseases, this knowledge will the help the pharmacist to deal effectively with patients and with colleague healthcare professionals.

يزود المقرر الطالب بالمعرفة في مفاهيم علم النفس الأساسية وخاصة الشخصية البشرية من حيث أنواعها، والعوامل المؤثرة عليها، وطرق تقييمها والتواصل معها. أيضًا ، يهتم المقرر بعلم النفس الطبي بما في ذلك الصحة النفسية وحالات الخوف والقلق والاكتئاب المرتبطة بالأمراض البشرية ، وستساعد هذه المعرفة الصيدلي على التعامل بفعالية مع المرضى ومع زملائه المتخصصين في الرعاية الصحية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & Understanding: Upon successful completion of the course, students will be able to **:**		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Identify the schools of psychology and the role of psychology in management of modern diseases
		a2. Define the essential psychological concepts such as mental ability, motives and emotions
		a3. Determine the basic human psychological needs and the emotional needs of ill people.
		a4. Describe various types of personalities and how to deal with each type.
A3	Explain physicochemical properties of materials and products	**a4**. Discuss the stages in development of human personality.
A4	Describe analytical methods, principles, design and development techniques	**a5.** Describe the role of pharmacists as health care professional in dealing with various personalities of patients and grasp their emotional needs.
Intellectual skills : Upon successful completion of the course, students will be able to **:**		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Compare between psychiatry, behavior medicine and psychology
		b2. Classify personalities of human into various categories.
		b3. Differentiate between psychopathic and normal persons.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis	**b4.** Assess the emotional needs of patients. select
Professional & practical skills : Upon successful completion of the course, students will be able to **:**		
C7	Conduct research and utilize the results in different pharmaceutical fields	**c1.** Present his/her thoughts, search for information and report works effectively using language.

Transferable skills : Upon successful completion of the course, students will be able to **:**		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively with patients.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Share successfully in team-work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the schools of psychology and the role of psychology in management of modern diseases	**Active Lecture, feed-back learning**	**written exam , assignment**
a2. Define the essential psychological concepts such as mental ability, motives and emotions		
a3. Determine the basic human psychological needs and the emotional needs of ill people.		
a4. Discuss the stages in development of human personality.	**Active Lecture**	**written exam**
a5. Describe the role of pharmacists as health care professional in dealing with various personalities of patients and grasp their emotional needs.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Compare between psychiatry, behavior medicine and psychology	**Active Lecture ,Feed-back learning**	**Written exam , assignment, quiz**
b2. Classify personalities of human into various categories.		
b3. Differentiate between psychopathic and normal persons.		
b4 . Assess the emotional needs of patients. select		

(c) Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to

Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Present his/her thoughts , search for information and report works effectively using language	**Feed-back learning, Group-project.**	**assignments**
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively with patients.	**Group-project, feed-back learning**	**Assignment, Written exam , assignment**
d2. Demonstrate skills of time management and self-learning.		
d3. Share successfully in team-work.		

IV. Course Content:

No	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to psychology**	a1	• Definition, historical progress • Purposes of psychology • schools of psychology.	2	4
2	**Human needs and drives**	a3	• Basic human needs and biological or primary drives, Secondary social and psychological drives.	2	4
3	**Psychology concepts**	a2	• Mental ability, Motor skills, motives • Sensation , Conceit , emotion	2	4
MID-TERM EXAM				1	2
4	**Personality**	a4, a5, b2, b3, b4, d2	• Definition and dimensional types • Growth and environment factors • Relationship between achievement of development stages goals and basic structure of personality. • Types of personalities • Methods of assessment • Dealing and communication with various types of personalities • Differences between psychopathic and normal persons.	4	8
5	**Medical psychology**	b1, d2	• Fear, anxiety and depression associated with Illness. • Emotional needs of ill persons • Psychological health and behavioral Medicine. • Psychiatry	3	6
Course Review		a1, a2, a3, a4,a5, b2, b3, b4, d2	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	Units

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to do a search-based report on one of the subtopics studies such as : psychology schools and concepts.	a1, b1, b2, b3, c1	4-13	6
2	**Group:** each group of students will be assigned to do a search report on how to deal with one of the following: • Mentally disables • Nervous personalities • Depressed patients • Self-proud persons	c1, d1, d2, d3	14	4

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method	Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Assignments	4-13, 14	10	10	a1, b1, b2, b3, c1, d1, d2, d3
2	Quizzes	7, 12	10	10	b1, b2, b3
3	Mid-semester (written exam)	7	20	20	a1, a2, a3
4	Final exam (written exam)	17	60	60	a1, a2, a3, b1, b2, b3, b4, d2
TOTAL			100	100 %	100

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Robert Bissau-Diener. Psychology as a Social Science, 2015, Noba

2- Essential References.

Tori Kearns. General Psychology: An Introduction. 2015, University System of Georgia

3- Electronic Materials and Web Sites *etc*.

1- https://nobaproject.com/textbooks/together-the-science-of-social-psychology
2- https://oer.galileo.usg.edu/cgi/viewcontent.cgi?article=1000&context=psychology-textbooks

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

ANATOMY

Course Code (**FMS212**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

I. Course Identification and General Information:

1	**Course Title:**	**Anatomy**				
2	**Course Code &Number:**	**FMS212**				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2	-	1		3
4	**Study level/ semester at which this course is offered:**	Second year / 1st semester				
5	**Pre –requisite:**	None				
6	**Co –requisite :**	FMS215(Physiology I)				
7	**Program (s) in which the course is offered:**	All Bachelor programs in the faculty of medical sciences				
8	**Language of teaching the course:**	English				
9	**Location of teaching the course:**	At the university facility				
10	**Prepared by**					
11	**Date of Approval**					

II. Course Description:

The course introduces the student to the main anatomical structure and main functions of the human body systems including skeletal, muscular, nervous, circulatory, respiratory and others. The practical part provides the student the skill to identify the morphological models of different human body systems.

يزود المقرر الدراسي الطالب بالمعرفة في البنية التشريحية الرئيسية والوظائف الأساسية للأجهزة المكونة لجسم الإنسان الجهاز الهيكلي والعضلي والعصبي والجهاز الدوري والجهاز التنفسي وغيرها. يوفر الجزء العملي للطالب مهارة التعرف على النماذج الشكلية لأنظمة الجسم المختلفة.

III. Intended learning outcomes of the course(CILOs) and their alignment to Program Intended learning outcomes (PILOs) and teaching and assessment strategies

1. Alignment to PILOs

PILOs		CILOS
Knowledge & understanding : Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body	**a1.** Show understanding of the basic concepts of anatomy and organization of human body.
		a2. Describe the types of systems in human body
Intellectual skills : Upon successful completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify human body into systems and organs
		b2. Differentiate between different organs in human body
		b3. Relate anatomical/histological structure with functions of organs and tissues in human body
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely different biological samples and chemicals in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate successfully the light microscope and other instruments used in the laboratory.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues and teachers.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate time management and self-learning skills**.**
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Work successfully in team-work in the anatomy lab

2. Alignment to teaching and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Show understanding of the basic concepts of anatomy and organization of human body.	**Active Lecture**	**written exams**
a2. Describe the types of systems in human body		
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify human body into systems and organs	**Active Lecture**	**written exams**
b2. Differentiate between different organs in human body	**Active Lecture, lab. practice**	**written exam, lab. term works, final practical exam**
b3. Relate anatomical/histological structure with functions of organs and tissues in human body	**Active Lecture , Feed-back learning**	**Written exams, assignment**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely different biological samples and chemicals in the laboratory	**Lab. Practice, Feed-back learning, group-project**	**lab. term works, final practical exam, assignment**
c2. Operate successfully the light microscope and other instruments used in the laboratory.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues and teachers.	**Lab. Practice , Group-project**	**lab. term works, final practical exam, assignment**
d3. Work successfully in team-work in the biology lab		
d2. Demonstrate time management and self-learning skills**.**	**Lab. Practice, feed-back learning**	**Lab. attitude, individual assignment**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	No. of Weeks	Contact hours	Learning Outcomes
1	The Skeletal System	▪ Bones- types, structure, Axial & Appendicular Skeleton, ▪ Bone formation and growth ▪ Description of bones ▪ Joints - classification and structure	2	4	a1, a2, b1, b3
2	The Muscular System	▪ Types and structure of muscles ▪ Muscle groups Alterations in disease Applications and implications in nursing	2	4	a1, a2, b1, b3
Midterm exam			1	2	
3	The Nervous System	▪ Structure of neuralgia & neurons ▪ Somatic Nervous system - Structure of brain, spinal cord, cranial nerves, spinal nerves, peripheral nerves ▪ Autonomic Nervous System - sympathetic, parasympathetic - Structure, location	2	4	a1, a2, b1, b3
4	Circulatory and lymphatic system	▪ The Circulatory System - Blood-Microscopic: structure - Structure of Heart - Structure of blood vessels- Arterial & Venous System, - Circulation: systemic, pulmonary, coronary ▪ Lymphatic system: - Lymphatic vessels and lymph - Lymphatic tissues - Thymus gland - Lymph nodes o Lymphatic nodules	2	4	a1, a2, b1, b3
5	The Respiratory	▪ Structure of the organs of			

	System	respiration ▪ Muscles of respiration: Intercostal and Diaphragm	2	4	a1, a2, b1, b3
6	The Digestive System	▪ Structure of Alimentary tract and accessory organs of digestion	1	2	a1, a2, b1, b3
7	The Excretory System (Urinary)	▪ Structure of organs of urinary ▪ System: Kidney, ureters, urinary bladder, urethra, structure of skin	1	2	a1, a2, b1, b3
8	The Endocrine System	▪ Structure of Pituitary, Pancreas, thyroid, Parathyroid, thymus and adrenal glands	1	2	a1, a2, b1, b3
9	The Reproductive system including breast	▪ Structure of female reproductive organs ▪ Structure of male reproductive organs. ▪ Structure of breast	1	2	a1, a2, b1, b3
	Final exam		1	2	a1, a2, b1, b3
Number of Weeks /and Units Per Semester			**16**	**32**	**9 UNITS**

B- Practical aspect

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Intended Learning Outcomes CILOs
30.	Introduction to laboratory safety + Plastic and virtual models of appendicular skeleton (1)	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
31.	Plastic and virtual models of Axial skeleton	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
32.	Plastic and virtual models of Muscles	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
33.	Plastic and virtual models of Nervous system	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
34.	Plastic and virtual models of Circulatory system	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
35.	Plastic and virtual models of Respiratory system	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
36.	Plastic and virtual models of Digestive system	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
37.	Plastic and virtual models of Urinary system	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
38.	Plastic and virtual models of Reproductive system	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
39.	Plastic and virtual models of Endocrine system	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
40.	Plastic and virtual models of The skin	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	a1, a2, b1, c1, c2, d2
Total		**12**	**24 equivalent to 12 credit hours**	
Number of Weeks			**12**	

V. Teaching strategies of the course:

1. Active Lecture
2. Feed-back learning
3. Laboratory practice

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Each student is assigned to draw anatomical features of an organ/system in the body	d1	4-10	5

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b3
		Assignments	7, 12	5	5	d1
2	Mid-semester exam (written exam)		7	10	10	a1, a2, b1, b3
3	Final exam (written exam)		16	50	50	a1, a2, b1, b3
		TOTAL		70	70 %	

Practical part assessment						
No.	**Assessment Method**		**Week Due**	**Mark**	**Proportion to Total course Assessment**	**Aligned Course Learning Outcomes(CILOs)**
1	Lab. Term works	Attitude	1-12	5	5	b2, c1, c2, d1, d2, d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	b2, c1, c2, d2
			Total	30	30 %	

VII. Learning Resources:

1- Required Textbook(s)

1. Cohen: Memmler's Structure & Function of Human Body, LWW.
2. Tortora, G.J.: Introduction to the human body. Harper and Row Publisher, New York.

2- Essential References.

1. Alexander P.: Human anatomy and physiology. Benjamin/Cummings Pub. California.
2. Waugh: Ross & Wilson Anatomy & Physiology, Elsevier

3- Electronic Materials and Web Sites *etc*.

VIII. Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** Any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments &Projects:** Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Course Plan (Syllabus) of

ANATOMY

I. Course Identification and General Information:

1	**Course Title:**	**Anatomy**				
2	**Course Code &Number:**	**FMS212**				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2	-	1		3
4	**Study level/ semester at which this course is offered:**	Second year / 1st semester				
5	**Pre –requisite:**	None				
6	**Co –requisite :**	FMS215(Physiology I)				
7	**Program (s) in which the course is offered:**	All Bachelor programs in the faculty of medical sciences				
8	**Language of teaching the course:**	English				
9	**Location of teaching the course:**	At the university facility				
10	**Prepared by**					
11	**Date of Approval**					

II. Course Description:

The course introduces the student to the main anatomical structure and main functions of the human body systems including skeletal, muscular, nervous, circulatory, respiratory and others. The practical part provides the student the skill to identify the morphological models of different human body systems.

يزود المقرر الدراسي الطالب بالمعرفة في البنية التشريحية الرئيسية والوظائف الأساسية للأجهزة المكونة لجسم الإنسان الجهاز الهيكلي والعضلي والعصبي والجهاز الدوري والجهاز التنفسي وغيرها. يوفر الجزء العملي للطالب مهارة التعرف على النماذج الشكلية لأنظمة الجسم المختلفة.

III. Intended learning outcomes of the course(CILOs) and their alignment to Program Intended learning outcomes (PILOs) and teaching and assessment strategies

1. Alignment to PILOs

PILOs		CILOS
Knowledge & understanding : Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body	**a1.** Show understanding of the basic concepts of anatomy and organization of human body.
		a2. Describe the types of systems in human body
Intellectual skills : Upon successful completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify human body into systems and organs
		b2. Differentiate between different organs in human body
		b3. Relate anatomical/histological structure with functions of organs and tissues in human body
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely different biological samples and chemicals in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate successfully the light microscope and other instruments used in the laboratory.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues and teachers.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate time management and self-learning skills**.**
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Work successfully in team-work in the biology lab

2. Alignment to teaching and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Show understanding of the basic concepts of anatomy and organization of human body.	**Active Lecture**	**written exams**
a2. Describe the types of systems in human body		
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify human body into systems and organs	**Active Lecture**	**written exams**
b2. Differentiate between different organs in human body	**Active Lecture, lab. practice**	**written exam, lab. term works, final practical exam**
b3. Relate anatomical/histological structure with functions of organs and tissues in human body	**Active Lecture , Feed-back learning**	**Written exams, assignment**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely different biological samples and chemicals in the laboratory	**Lab. Practice, Feed-back learning, group-project**	**lab. term works, final practical exam, assignment**
c2. Operate successfully the light microscope and other instruments used in the laboratory.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues and teachers.	**Lab. Practice, Group-project**	**lab. term works, final practical exam, assignment**
d3. Work successfully in team-work in the biology lab		
d2. Demonstrate time management and self-learning skills**.**	**Lab. Practice, feed-back learning**	**Lab. attitude, individual assignment**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	No. of Weeks	Contact hours	Learning Outcomes
1	The Skeletal System	▪ Bones- types, structure, Axial & Appendicular Skeleton, ▪ Bone formation and growth ▪ Description of bones ▪ Joints - classification and structure	2	4	a1, a2, b1, b3
2	The Muscular System	▪ Types and structure of muscles ▪ Muscle groups Alterations in disease Applications and implications in nursing	2	4	a1, a2, b1, b3
Midterm exam			1	2	
3	The Nervous System	▪ Structure of neuralgia & neurons ▪ Somatic Nervous system - Structure of brain, spinal cord, cranial nerves, spinal nerves, peripheral nerves ▪ Autonomic Nervous System - sympathetic, parasympathetic - Structure, location	2	4	a1, a2, b1, b3
4	Circulatory and lymphatic system	▪ The Circulatory System - Blood-Microscopic: structure - Structure of Heart - Structure of blood vessels- Arterial & Venous System, - Circulation: systemic, pulmonary, coronary ▪ Lymphatic system: - Lymphatic vessels and lymph - Lymphatic tissues - Thymus gland - Lymph nodes o Lymphatic nodules	2	4	a1, a2, b1, b3
5	The Respiratory	▪ Structure of the organs of			

	System	respiration ▪ Muscles of respiration: Intercostal and Diaphragm	2	4	a1, a2, b1, b3
6	The Digestive System	▪ Structure of Alimentary tract and accessory organs of digestion	1	2	a1, a2, b1, b3
7	The Excretory System (Urinary)	▪ Structure of organs of urinary ▪ System: Kidney, ureters, urinary bladder, urethra, structure of skin	1	2	a1, a2, b1, b3
8	The Endocrine System	▪ Structure of Pituitary, Pancreas, thyroid, Parathyroid, thymus and adrenal glands	1	2	a1, a2, b1, b3
9	The Reproductive system including breast	▪ Structure of female reproductive organs ▪ Structure of male reproductive organs. ▪ Structure of breast	1	2	a1, a2, b1, b3
	Final exam		1	2	a1, a2, b1, b3
Number of Weeks /and Units Per Semester			**16**	**32**	**9 UNITS**

B- Practical aspect

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Intended Learning Outcomes CILOs
1.	Introduction to laboratory safety + Plastic and virtual models of appendicular skeleton (1)	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
2.	Plastic and virtual models of Axial skeleton	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
3.	Plastic and virtual models of Muscles	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
4.	Plastic and virtual models of Nervous system	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
5.	Plastic and virtual models of Circulatory system	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
6.	Plastic and virtual models of Respiratory system	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
7.	Plastic and virtual models of Digestive system	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
8.	Plastic and virtual models of Urinary system	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
9.	Plastic and virtual models of Reproductive system	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
10.	Plastic and virtual models of Endocrine system	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
11.	Plastic and virtual models of The skin	**1**	**2**	a1, b2, c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	a1, a2, b1, c1, c2, d2
Total		**12**	**24 equivalent to 12 credit hours**	
Number of Weeks			**12**	

V. Teaching strategies of the course:

1. Active Lecture
2. Feed-back learning
3. Laboratory practice

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Each student is assigned to draw anatomical features of an organ/system in the body	d1	4-10	5

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b3
		Assignments	7, 12	5	5	d1
2	Mid-semester exam (written exam)		7	10	10	a1, a2, b1, b3
3	Final exam (written exam)		16	50	50	a1, a2, b1, b3
		TOTAL		70	70 %	

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b2, c1, c2, d1, d2, d3
2		Accomplishments		5	5	

3	Final exam (practical)	12	20	20	b2, c1, c2, d2
		Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s)

1. Cohen: Memmler's Structure & Function of Human Body, LWW.
2. Tortora, G.J.: Introduction to the human body. Harper and Row Publisher, New York.

2- Essential References.

1. Alexander P.: Human anatomy and physiology. Benjamin/Cummings Pub. California.
2. Waugh: Ross & Wilson Anatomy & Physiology, Elsevier

3- Electronic Materials and Web Sites *etc*.

VIII. Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** Any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments &Projects:** Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

BIOCHEMISTRY I

Course Code (**FMS213**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

VII. Course Identification and General Information:

89	**Course Title:**	**BIOCHEMISTRY I**					
90	**Course Code :**	**FMS213**					
91	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
92	**Study level/ semester at which this course is offered:**	*(2ND) Year – (SECOND) semester*					
93	**Pre –requisite (if any):**	**None**					
94	**Co –requisite (if any):**	**PHR217 (Phar. Organic Chemistry I)**					
95	**Program (s) in which the course is offered:**	**All Bachelor programs in the faculty of medical sciences**					
96	**Language of teaching the course:**	**ENGLISH**					
97	**Location of teaching the course:**	**At the university facility**					
98	**Prepared by**						
99	**Date of Approval**						

L: lecturing; Tut: Tutorial, S: seminar; P: practical; Tr.: training

II. Course Description:

The course provides the student basic knowledge of the types, sources, biological regulation, chemical structure, biosynthesis, metabolic pathways and the functions of the biological macromolecules, including carbohydrates, lipids, proteins, and their correlation to human diseases due to either their increase or deficiency in the human body. The practical part of the course provides the student with skills to identify those biomolecules in vitro and to bioassay them in biological samples.

بزود المقرر الدراسي الطالب بالمعرفة الأساسية لأنواع ومصادر والتنظيم البيولوجي والأشكال الكيميائية والتخليق الحيوي والمسارات الاستقلابية والوظائف الحيوية للجزيئات البيولوجية كبيرة الحجم (السكريات والدهون والبروتينات) وارتباطها بالأمراض البشرية إما بسبب زيادتها أو نقصها في جسم الإنسان. يزود الجزء العملي من المقرر الطالب بالمهارات اللازمة للكشف عن تلك المركبات في المختبر و كذلك قياسها في العينات الحيوية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding : Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Identify the roles of biochemical compounds in human body.
		a2. Explicit the physiological/pathological involvement of carbohydrates, lipids, proteins.
A3	Explain physicochemical properties of materials and products	**a3**. Explain the physicochemical properties of carbohydrates, proteins and lipids..
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret body diseases resulted from disturbances in levels of carbohydrate, proteins and lipids.
		b2. Predict the outcomes of biochemical reactions involving carbohydrate, proteins and lipids..
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3 .** Classify carbohydrates, proteins, and lipids. .
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b4.** Select standard operation procedure for isolation of carbohydrates, proteins and lipids from blood.
		b5. Choose a method for identification of carbohydrates, proteins and lipids.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	**C1.** Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	**C2.** Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory.
C3	**C3.** Screen for drugs from different sources and carry out pharmacy relevant	**c3 .**Bioassay proteins, carbohydrates and lipids in blood

	experiments successfully.	
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c4 .**Search efficiently for information using documented and electronic sources of information.
		c5. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the roles of biochemical compounds in human body.	**Active Lecture, laboratory practice**	**written exams , Lab. term work, final practical exam**
a2. Explicit the physiological/pathological involvement of carbohydrates, lipids, proteins.		
a3. Explain the physicochemical properties of carbohydrates, proteins and lipids..		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret body diseases resulted from disturbances in levels of carbohydrate, proteins and lipids.	**Active Lecture, feed-back learning**	**Written exam, quizzes**
b2. Predict the outcomes of biochemical reactions involving carbohydrate, proteins and lipids..		
b3 . Classify carbohydrates, proteins, and lipids. .		
b4. Select standard operation procedure for isolation	**Active Lecture , feed-**	**written exam , quizzes, Lab.**

of carbohydrates, proteins and lipids from blood.	**back learning, Lab. practice**	**term work, final practical exam**
B5. Choose a method for identification of carbohydrates, proteins and lipids.		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**Lab. Practice**	**Lab. term work, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory.		
c3 . Bioassay proteins, carbohydrates and lipids in blood		
c4 . Search efficiently for information using documented and electronic sources of information.	**Group-project, feed-back learning**	**Assignment**
c5. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**Group-project , Lab. practice**	**Assignment s, Lab. term work, final practical exam**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Feed-back learning , Lab. practice**	**Assignment s, Lab. term work, final practical exam**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, a2, a3	• Definition and significance • General roles of biochemistry • Properties and classification of biochemicals	1	2
2	**Carbohydrates**	a1, a2, a3, b1, b2, b3, b4,b5	• Classifications and physiological roles • Glycolysis • Citric acid cycle • Glycogenesis and glycogenolysis • Hexose monophosphate shunt • Uronic acid pathway • Blood sugar and its regulation. • Pathological conditions related carbohydrates.	4	8
3	**Lipids (1)**	a1, a2, a3, b1, b2, b3, b4,b5	• Classifications and physiological roles • Biosynthesis of fats • Oxidation of fatty acids • Ketogenesis and ketosis • Metabolism of cholesterol • Essential fatty acid and eicosanodis phospholipids. • Sphingolipids. • Bile salts • Pathological conditions related to lipids.	2	4
MID-TERM EXAM				1	2
3	**Lipids (2)**	a1, a2, a3, b1, b2, b3, b4,b5	• Classifications and physiological roles • Biosynthesis of fats • Oxidation of fatty acids • Ketogenesis and ketosis • Metabolism of cholesterol • Essential fatty acid and eicosanodis phospholipids. • Sphingolipids.	2	4

			• Bile salts • Pathological conditions related to lipids.		
4	**Proteins**	a1, a2, a3, b1, b2, b3, b4,b5	• Classification of aminoacides • General biochemical reaction of amino acids like • Transamination • Deamination • Decarboxylation • Peptides and polypeptides • Biosynthesis of proteins: role of DNA • Classifications and physiological roles of proteins • Metabolism of proteins • Urea cycle • Nitrogen balance • Pathological conditions related to proteins.	5	10 4
Course Review		a1, a2, a3, b1, b2, b3, b4,b5	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	4 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	introduction to biochemistry chemistry Lab.: safety requirements, list of experiments, How to report, etc.	**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
2.	Carbohydrates: monosaccharaides : physicochemical properties and in vitro identification & differentiation.	**2**	**4**	b4, b5, c1, c2, c3, d1, d2, d3
3.	Carbohydrates: disaccharides physicochemical properties and in vitro identification & differentiation.	**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
4.	Carbohydrates: polysaccharides physicochemical properties and in vitro identification & differentiation.	**2**	**4**	b4, b5, c1, c2, c3, d1, d2, d3
5.	Sampling and preserving of human samples : blood, urine	**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
6.	Bioassay of blood glucose	**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
7.	Lipids: physicochemical properties and in vitro identification of cholesterol.	**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
8.	Bioassay of cholesterol in human blood	**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
9.	Proteins: physicochemical properties and in vitro identification of certain types of proteins	**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
10.	Bioassay of proteins in human blood	**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
Total		**12**	**24 equivalent to 12 credit hours**	
Number of Weeks			**12**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: the teacher provide the students with biochemical problems related to the studied topics. Every student is assigned to solve some of those problems individually.	d2, c4, c5	4-13	
2	**Group** : each group of students will be assigned to present a search report on one pathological condition related to disturbances in biochemical levels in the body.	d1, d2, d3, c4, c5	14	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4, b5
		Assignments	7, 12	5	5	c3, c4, d1, d2, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2, a3, b1, b2, b3, b4, b5
3	Final exam (written exam)		16	50	50	a1, a2, a3, b1, b2, b3, b4, b5
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b4, b5, c1, c2,c3, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	b4, b5, c1, c2,c3, d1, d2, d3
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Kevin Ahern. Biochemistry free for all. 2018, Oregon State University

2- Essential References.

1. Pamela C. Champe, Lippincott's illustrated review in Biochemistry, 2010, Lippincott William & Wilkins

3- Electronic Materials and Web Sites *etc*.

1- https://uh.edu/sibs/faculty/glegge/lectures.htm
2- https://biochem.oregonstate.edu/node/392

IX. Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of **BIOCHEMISTRY I**

I. Course Identification and General Information:

1.	**Course Title:**	**BIOCHEMISTRY I**					
2.	**Course Code :**	**FMS213**					
3.	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
4.	**Study level/ semester at which this course is offered:**	*(2ND) Year – (SECOND) semester*					
5.	**Pre –requisite (if any):**	**None**					
6.	**Co –requisite (if any):**	**PHR217 (Phar. Organic Chemistry I)**					
7.	**Program (s) in which the course is offered:**	**All Bachelor programs in the faculty of medical sciences**					
8.	**Language of teaching the course:**	**ENGLISH**					
9.	**Location of teaching the course:**	**At the university facility**					
10	**Prepared by**						
11	**Date of Approval**						

II. Course Description:

The course provides the student basic knowledge of the types, sources, biological regulation, chemical structure, biosynthesis, metabolic pathways and the functions of the biological macromolecules, including carbohydrates, lipids, proteins, and their correlation to human diseases due to either their increase or deficiency in the human body. The practical part of the course provides the student with skills to identify those biomolecules in vitro and to bioassay them in biological samples.

بزود المقرر الدراسي الطالب بالمعرفة الأساسية لأنواع ومصادر والتنظيم البيولوجي والأشكال الكيميائية والتخليق الحيوي والمسارات الاستقلابية والوظائف الحيوية للجزيئات البيولوجية كبيرة الحجم (السكريات والدهون والبروتينات) وارتباطها بالأمراض البشرية إما بسبب زيادتها أو نقصها في جسم الإنسان. يزود الجزء العملي من المقرر الطالب بالمهارات اللازمة للكشف عن تلك المركبات في المختبر و كذلك قياسها في العينات الحيوية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding : Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Identify the roles of biochemical compounds in human body.
		a2. Explicit the physiological/pathological involvement of carbohydrates, lipids, proteins.
A3	Explain physicochemical properties of materials and products	**a3**. Explain the physicochemical properties of carbohydrates, proteins and lipids..
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret body diseases resulted from disturbances in levels of carbohydrate, proteins and lipids.
		b2. Predict the outcomes of biochemical reactions involving carbohydrate, proteins and lipids..
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3 .** Classify carbohydrates, proteins, and lipids. .
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b4.** Select standard operation procedure for isolation of carbohydrates, proteins and lipids from blood.
		b5. Choose a method for identification of carbohydrates, proteins and lipids.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	**C1.** Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	**C2.** Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory.
C3	Screen for drugs from different sources and carry out pharmacy relevant experiments	**c3 .**Bioassay proteins, carbohydrates and lipids in blood

	successfully.	
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c4 .**Search efficiently for information using documented and electronic sources of information.
		c5. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the roles of biochemical compounds in human body.	**Active Lecture, laboratory practice**	**written exams , Lab. term work, final practical exam**
a2. Explicit the physiological/pathological involvement of carbohydrates, lipids, proteins.		
a3. Explain the physicochemical properties of carbohydrates, proteins and lipids..		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret body diseases resulted from disturbances in levels of carbohydrate, proteins and lipids.	**Active Lecture, feed-back learning**	**Written exam, quizzes**
b2. Predict the outcomes of biochemical reactions involving carbohydrate, proteins and lipids..		
b3 . Classify carbohydrates, proteins, and lipids. .		
b4. Select standard operation procedure for isolation	**Active Lecture , feed-**	**written exam , quizzes, Lab.**

of carbohydrates, proteins and lipids from blood.	**back learning, Lab. practice**	**term work, final practical exam**
B5. Choose a method for identification of carbohydrates, proteins and lipids.		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**Lab. Practice**	**Lab. term work, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory.		
c3 . Bioassay proteins, carbohydrates and lipids in blood		
c4 . Search efficiently for information using documented and electronic sources of information.	**Group-project, feed-back learning**	**Assignment**
c5. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**Group-project , Lab. practice**	**Assignment s, Lab. term work, final practical exam**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Feed-back learning , Lab. practice**	**Assignment s, Lab. term work, final practical exam**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, a2, a3	• Definition and significance • General roles of biochemistry • Properties and classification of biochemicals	1	2
2	**Carbohydrates**	a1, a2, a3, b1, b2, b3, b4,b5	• Classifications and physiological roles • Glycolysis • Citric acid cycle • Glycogenesis and glycogenolysis • Hexose monophosphate shunt • Uronic acid pathway • Blood sugar and its regulation. • Pathological conditions related carbohydrates.	4	8
3	**Lipids (1)**	a1, a2, a3, b1, b2, b3, b4,b5	• Classifications and physiological roles • Biosynthesis of fats • Oxidation of fatty acids • Ketogenesis and ketosis • Metabolism of cholesterol • Essential fatty acid and eicosanodis phospholipids. • Sphingolipids. • Bile salts • Pathological conditions related to lipids.	2	4
MID-TERM EXAM				1	2
3	**Lipids (2)**	a1, a2, a3, b1, b2, b3, b4,b5	• Classifications and physiological roles • Biosynthesis of fats • Oxidation of fatty acids • Ketogenesis and ketosis • Metabolism of cholesterol • Essential fatty acid and eicosanodis phospholipids. • Sphingolipids.	2	4

			• Bile salts • Pathological conditions related to lipids.		
4	**Proteins**	a1, a2, a3, b1, b2, b3, b4,b5	• Classification of aminoacides • General biochemical reaction of amino acids like • Transamination • Deamination • Decarboxylation • Peptides and polypeptides • Biosynthesis of proteins: role of DNA • Classifications and physiological roles of proteins • Metabolism of proteins • Urea cycle • Nitrogen balance • Pathological conditions related to proteins.	5	10 4
Course Review		a1, a2, a3, b1, b2, b3, b4,b5	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	4 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	introduction to biochemistry chemistry Lab.: safety requirements, list of experiments, How to report, etc.	**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
2.	Carbohydrates: monosaccharaides : physicochemical properties and in vitro identification & differentiation.	**2**	**4**	b4, b5, c1, c2, c3, d1, d2, d3
3.	Carbohydrates: disaccharides physicochemical properties and in vitro identification & differentiation.	**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
4.	Carbohydrates: polysaccharides physicochemical properties and in vitro identification & differentiation.	**2**	**4**	b4, b5, c1, c2, c3, d1, d2, d3
5.	Sampling and preserving of human samples : blood, urine	**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
6.	Bioassay of blood glucose	**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
7.	Lipids: physicochemical properties and in vitro identification of cholesterol.	**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
8.	Bioassay of cholesterol in human blood	**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
9.	Proteins: physicochemical properties and in vitro identification of certain types of proteins	**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
10.	Bioassay of proteins in human blood	**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
Total		**12**	**24 equivalent to 12 credit hours**	
Number of Weeks			**12**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: the teacher provide the students with biochemical problems related to the studied topics. Every student is assigned to solve some of those problems individually.	d2, c4, c5	4-13	
2	**Group** : each group of students will be assigned to present a search report on one pathological condition related to disturbances in biochemical levels in the body.	d1, d2, d3, c4, c5	14	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4, b5
		Assignments	7, 12	5	5	c3, c4, d1, d2, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2, a3, b1, b2, b3, b4, b5
3	Final exam (written exam)		16	50	50	a1, a2, a3, b1, b2, b3, b4, b5
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b4, b5, c1, c2,c3, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	b4, b5, c1, c2,c3, d1, d2, d3
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Kevin Ahern. Biochemistry free for all. 2018, Oregon State University

2- Essential References.

1. Pamela C. Champe, Lippincott's illustrated review in Biochemistry, 2010, Lippincott William & Wilkins

3- Electronic Materials and Web Sites *etc*.

1- https://uh.edu/sibs/faculty/glegge/lectures.htm
2- https://biochem.oregonstate.edu/node/392

IX. Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

MEDICAL ETHICS

Course Code (**FMS211**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

VIII. Course Identification and General Information:

10	**Course Title:**	**MEDICAL ETHICS**					
10	**Course Code &Number:**	**FMS211**					
10	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	-	-	**2**
10	**Study level/ semester at which this course is offered:**	*(2nd) Year – (first) semester*					
10	**Pre –requisite (if any):**	**None**					
10	**Co –requisite (if any):**	**None**					
10	**Program (s) in which the course is offered:**	**All BC programs offered by the faculty of medical sciences**					
10	**Language of teaching the course:**	**ENGLISH**					
10	**Location of teaching the course:**	**At the university facility**					
10	**Prepared by**						
11	**Date of Approval**						

L: lecturing; Tut: Tutorial, S: seminar; P: practical; Tr.: training

IX. Course Description:

The course provides the students with basic knowledge of authority foundations that regulate healthcare professions in Yemen, region and the world. The course also focuses on healthcare regulations, acts and code of ethics. The main purpose of this course is to make the student able to demonstrate and practice his/her responsibilities as medical healthcare specialists ethically and legally and to respect the rights of patients, colleagues and healthcare professionals.

يزود المقرر الدراسي الطلاب بالمعرفة عن السلطات التي تنظم مهن الرعاية الصحية في اليمن والمنطقة والعالم. ويركز المقرر أيضًا على لوائح وأعمال وقواعد السلوك في مجال الرعاية الصحية. الغرض الرئيسي من هذا المقرر هو جعل الطالب قادرًا على أهمية ممارسة عمله كأخصائي في الرعاية الصحية الطبية بطريقة أخلاقية وقانونية واحترام حقوق المرضى والزملاء المتخصصين في الرعاية الصحية

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

13. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding : Upon successful completion of the course, students will be able to:		
A2	Explain the fundamental of social and behavioral sciences.	**a1.** Explain the fundamentals of pharmacy regulations and ethics and their impact to relationship with patients and healthcare professionals
A10	Describe the pharmacists role in different pharmacy practices.	**a2.** Describe the pharmacists role to practice pharmacy legally and ethically.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B5	Plan a modern system for administration of foundations and merge ethics to business in drug marketing	**b1.** Emerge ethics to different types of pharmacy practice
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C6	Apply administrative and Pharmacoeconomics rules in pharmacy and ethically use marketing skills for drug promotion.	**c1** .Ethically use knowledge and skills in pharmacy.
Transferable skills : Upon successful completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate time management and self-learning skills
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d2.** Take responsibility of adaption to change needs in pharmacy practice.

14. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the fundamentals of pharmacy regulations and ethics and their impact to relationship with patients and healthcare professionals	**Active Lecture**	**Written exams**
a2. Describe the pharmacists role to practice pharmacy legally and ethically.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Emerge ethics to different types of pharmacy practice	**feed-back learning**	**Assignments, quizzes**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Ethically use knowledge and skills in pharmacy.	**feed-back learning**	**Assignments**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate time management and self-learning skills	**feed-back learning**	**Assignments**
d2. Take responsibility of adaption to change needs in pharmacy practice.		

XII. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, a2	• Definition of regulations, act, laws • History of healthcare regulations	1	2
2	**Foundations and authorities controlling Medical profession**	a1, a2	➢ Authority in: • Yemen • Arab countries • International ➢ Healthcare practice licenses: requirements and procedures in Yemen , Arab countries and international	2	4
3	**Regulations and acts of Healthcare professions in Yemen**	a1, a2	Healthcare Regulations and acts controlling pharmacy profession in Yemen	3	6
Mid-term exam				1	2
3	**Regional and international Regulations and acts of Healthcare professions**		Regulations in Arab countries and global e.g. UK and USA	2	4
4	**Patients and professional Rights**	a1, a2	• Patient rights • Medical workers rights	3	6
5	**Healthcare Code of Ethics**	a1, a2	• Old (Oath of Hippocrates) • Arab countries • Asian • Europe • USA • Local (Yemeni) Code of ethics	2	4
Course Review		a1, a2	Review of the course topics by discussion session.	1	

				2
FINAL - EXAM			1	2
TOTAL			16	32
Number of Weeks /and Units Per Semester			16 weeks	5 Units

XII. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

XIV. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to provide a survey/observational/ and/or web-search based report on one illegal or non-ethical issue related to pharmacy practice in Yemen	b1, c1, d1, d2	12	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b1
		Assignments	12	10	10	b1, c1, d1, d2
2	Mid-semester exam (written exam)		7	20	20	a1, a2
3	Final exam of (written exam)		16	60	60	a1, a2
		TOTAL		100	100 %	

XVI. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Yemeni law of medical profession and pharmacy
2. Pharmacy code of ethics. USA, 2018 American association of pharmacy
3. Pharmacy laws & regulations, USA, 2014

2- Essential References.

1. قانون مزاولة مهنة الصيدلة- مصر

3- Electronic Materials and Web Sites *etc*.

http://doh.dc.gov/service/pharmacy-laws-and-regulations

XVI. Course Policies:

29.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
30.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
31.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
32.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**:

	Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism:** Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of **MEDICAL ETHICS**

I. Course Identification and General Information:

1.	Course Title:	MEDICAL ETHICS					
2.	Course Code &Number:	FMS211					
3.	Credit hours:	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	-	-	**2**
4.	Study level/ semester at which this course is offered:	*(2nd) Year – (first) semester*					
5.	Pre –requisite (if any):	None					
6.	Co –requisite (if any):	None					
7.	Program (s) in which the course is offered:	All BC programs offered by the faculty of medical sciences					
8.	Language of teaching the course:	ENGLISH					
9.	Location of teaching the course:	At the university facility					
10	Prepared by						
11	Date of Approval	2020					

L: lecturing ; Tut: Tutorial , S: seminar ; P: practical ; Tr.: training

II. Course Description:

The course provides the students with basic knowledge of authority foundations that regulate healthcare professions in Yemen, region and the world. The course also focuses on healthcare regulations, acts and code of ethics. The main purpose of this course is to make the student able to demonstrate and practice his/her responsibilities as medical healthcare specialists ethically and legally and to respect the rights of patients, colleagues and healthcare professionals.

يزود المقرر الدراسي الطلاب بالمعرفة عن السلطات التي تنظم مهن الرعاية الصحية في اليمن والمنطقة والعالم. ويركز المقرر أيضًا على لوائح وأعمال وقواعد السلوك في مجال الرعاية الصحية. الغرض الرئيسي من هذا المقرر هو جعل الطالب قادرًا على أهمية ممارسة عمله كأخصائي في الرعاية الصحية الطبية بطريقة أخلاقية وقانونية واحترام حقوق المرضى والزملاء المتخصصين في الرعاية الصحية

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding : Upon successful completion of the course, students will be able to:		
A2	Explain the fundamental of social and behavioral sciences.	**a1.** Explain the fundamentals of pharmacy regulations and ethics and their impact to relationship with patients and healthcare professionals
A10	Describe the pharmacists role in different pharmacy practices.	**a2.** Describe the pharmacists role to practice pharmacy legally and ethically.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B5	Plan a modern system for administration of foundations and merge ethics to business in drug marketing	**b1.** Emerge ethics to different types of pharmacy practice
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C6	Apply administrative and Pharmacoeconomics rules in pharmacy and ethically use marketing skills for drug promotion.	**c1 .**Ethically use knowledge and skills in pharmacy.
Transferable skills : Upon successful completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate time management and self-learning skills
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d2.** Take responsibility of adaption to change needs in pharmacy practice.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the fundamentals of pharmacy regulations and ethics and their impact to relationship with patients and healthcare professionals	**Active Lecture**	**Written exams**
a2. Describe the pharmacists role to practice pharmacy legally and ethically.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Emerge ethics to different types of pharmacy practice	**feed-back learning**	**Assignments, quizzes**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Ethically use knowledge and skills in pharmacy.	**feed-back learning**	**Assignments**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate time management and self-learning skills	**feed-back learning**	**Assignments**
d2. Take responsibility of adaption to change needs in pharmacy practice.		

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, a2	• Definition of regulations, act, laws • History of healthcare regulations	1	2
2	**Foundations and authorities controlling Medical profession**	a1, a2	➢ Authority in: • Yemen • Arab countries • International ➢ Healthcare practice licenses: requirements and procedures in Yemen , Arab countries and international	2	4
3	**Regulations and acts of Healthcare professions in Yemen**	a1, a2	Healthcare Regulations and acts controlling pharmacy profession in Yemen	3	6
Mid-term exam				1	2
3	**Regional and international Regulations and acts of Healthcare professions**		Regulations in Arab countries and global e.g. UK and USA	2	4
4	**Patients and professional Rights**	a1, a2	• Patient rights • Medical workers rights	3	6
5	**Healthcare Code of Ethics**	a1, a2	• Old (Oath of Hippocrates) • Arab countries • Asian • Europe • USA • Local (Yemeni) Code of ethics	2	4

Course Review	a1, a2	Review of the course topics by discussion session.	1	2
FINAL - EXAM			1	2
TOTAL			16	32
Number of Weeks /and Units Per Semester			16 weeks	5 Units

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to provide a survey/observational/ and/or web-search based report on one illegal or non-ethical issue related to pharmacy practice in Yemen	b1, c1, d1, d2	12	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b1
		Assignments	12	10	10	b1, c1, d1, d2
2	Mid-semester exam (written exam)		7	20	20	a1, a2
3	Final exam of (written exam)		16	60	60	a1, a2
		TOTAL		100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Yemeni law of medical profession and pharmacy
2. Pharmacy code of ethics. USA, 2018 American association of pharmacy
3. Pharmacy laws & regulations, USA, 2014

2- Essential References.

1. قانون مزاولة مهنة الصيدلة- مصر

3- Electronic Materials and Web Sites *etc*.

http://doh.dc.gov/service/pharmacy-laws-and-regulations

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PHARMACEUTICAL ANALYTICAL CHEMISTRY I

Course Code (**PHR214**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

X. Course Identification and General Information:

11	Course Title:	PHARMACEUTICAL ANALYTICAL CHEMISTRY I			
11	Course Code &Number:	**PHR214**			
11	Credit hours:	C.H			TOTAL
		L.	P.	T.	
		2	1	-	**3**
11	Study level/ semester at which this course is offered:	*(SECOND) Year – (1ST) semester*			
11	Pre –requisite (if any):	PHR126 **(Pharmaceutical calculations)**			
11	Co –requisite (if any):	**None**			
11	Program (s) in which the course is offered:	**Pharmacy Bachelor**			
11	Language of teaching the course:	**ENGLISH**			
11	Location of teaching the course:	**At the university facility**			
12	Prepared by				
12	Date of Approval				

L: lecturing ; ; P: practical ; T.: training

XI. Course Description:

The course provides the student with basic knowledge of analysis of substances, including types of qualitative and quantitative analysis, preparation of analytical samples, types of analytical techniques, validation of analysis, and how to avoid the source of errors in analysis. The course also focuses on the concepts and theoretical underpinnings of two types of analysis: titrimetric analysis and electrochemical analysis. The practical part provides the student with the skill of dealing with chemicals, operating analytical instruments, and performing analytical experiments in a chemistry lab. This course is taken in conjunction with another course (Pharmaceutical Organic Chemistry I) to make the student link the concept of analysis and the chemical nature of compounds.

يزود المقرر الطالب بالمعرفة الأساسية لتحليل المواد ويشمل ذلك أنواع التحليل النوعي والكمي وكيفية إعداد العينات التحليلية، وأنواع التقنيات التحليلية، واجراءات التحقق من صحة التحليل، وكيفية تجنب مصدر الأخطاء. كما يركز المقرر الدراسي أيضًا على المفاهيم والأسس النظرية لنوعين من التحليل: التحليل بالمعايرة والتحليل الكهروكيميائي. ويوفر الجزء العملي للطالب مهارة التعامل مع المواد الكيميائية وتشغيل الأجهزة التحليلية وإجراء اختبارات التحليل في معمل الكيمياء. يؤخذ هذا المقرر بالتزامن مع مقرر اخر (الكيمياء العضوية الصيدلانية 1) لجعل الطالب يربط بين مفهوم التحليل والطبيعة الكيميائية للمركبات .

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1**. Explain the physicochemical properties of substances that can be utilized for their qualitative and quantitative analysis
A4	Describe analytical methods, principles, design and development techniques	**a2**. Describe the principles of titrimetric and electrochemical analysis.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist to perform accurate and precise quantitative and qualitative analysis.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret data obtained by titrimetric and electrochemical analysis.
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b2.** Design a suitable titrimetric and electrochemical analysis. based on the substance physicochemical properties.
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b3.** Select appropriate standard operating procedure for titrimetric and electrochemical analysis.
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b4.** Calculate the content % of a material in a sample using titrimetric and electrochemical analysis.

Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4. Present and report his/her works correctly using appropriate writing rules and technologies media.
Intellectual skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge& understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the physicochemical properties of substances that can be utilized for their qualitative and quantitative analysis	**Active Lecture**	**Written exam s**
a2. Describe the principles of titrimetric and electrochemical analysis.		
a3. Describe the role of pharmacist to perform accurate and precise quantitative and qualitative analysis.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret data obtained by titrimetric and electrochemical analysis.	**Active Lecture , laboratory practice, Feed-back learning**	**Written exams, quizzes, lab. term work, practical final exam**
b2. Design a suitable titrimetric and electrochemical analysis. based on the substance physicochemical properties.		
b3. Select appropriate standard operating procedure for titrimetric and electrochemical analysis.		
b4. Calculate the content % of a material in a sample using titrimetric and electrochemical analysis.		

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c4. Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Lab. practice, group-project, feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**

XIII. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to analytical chemistry& analytical techniques**	a1,a2, a3, b1, b2, b3, b4	• Definitions, brief history, scope of applications • Quantitative and qualitative analysis (purposes, types) • Validation of analysis ○ Source of errors ○ Sampling procedures. ○ calibration of analytical equipment ○ preparation of standard solutions and calibration curve ○ Analyzing of results: average, SD, coefficient of variation (CV%), accuracy, precision ○ Significant numbers, rejection of doubtful values • Manual versus instrumental analytical techniques: types, advantages , disadvantages.	2	4
2	**Titrimetric analysis (1-Aqueous Acid Base Titration)**	a1,a2, a3, b1, b2, b3, b4	• Types & comparison of titrimetric analysis Definitions • Distribution of acid-base species with pH of the medium. • Acid-Base titrimetry for determination of weakly acidic and basic drugs. • Indicators (theories) and their selection • **applications and solve problems**	2	4
	Titrimetric analysis (2-Non-Aqueous Acid Base titration)	a1,a2, a3, b1, b2, b3, b4	• Theoretical considerations and principles. • Bronsted Lowery of acids and bases. • Non-aqueous solvents. • Titration of weak acids and weak bases. • **Applications and solve problems**	2	4

2	**Titrimetric analysis (3- Oxidation Reduction Titration)**	a1,a2, a3, b1, b2, b3, b4	• Principles and concepts, determination involving oxidizing agents • iodimetric and iodometric determination, miscellaneous oxidation and reduction titrations. Indicators • applications. • chromometric determination, miscellaneous oxidation • Applications and **solve problems**	1	2
	Titrimetric analysis (4- Complexometric Titration)	a1,a2, a3, b1, b2, b3, b4	• Principle, Complexes and chelates, stability of complex ions. • Types of Complexometric titrations. Technique employed in complexometric titration, End point detection • Applications and **solve problems**	2	4
MID-TERM EXAM				1	2
3	**Electrochemical analysis**	a1,a2, a3, b1, b2, b3, b4	• **Electrogravimetric analysis:** Theory of electroanalysis, polarizatuon, decomposition, potential and over voltage electrolytic determination at constant current and with controlled potential at the cathode. • **Conductometry**: experimental details of conductometric titration and applications. • **Potentiometry**: Principles, methods and application. • **Amperometry:** theory and technique of amperometric titration with dropping mercury electrode, high frequency titration, its applications. • **Polarographic analysis**: Introduction, principles, diffusion current and half wave potential, quantitative techniques. • **Applications and solve problems**	4	8
Course Review		a1,a2, a3, b1, b2,	Review	1	3

	b3, b4			
FINAL – EXAM			1	2
TOTAL			16	32
Number of Weeks /and Units Per Semester			16 weeks	4 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
41.	**introduction to the Lab.: safety requirements, list of experiments, How to report, source of errors, etc**	**1**	**2**	c1, c2, d1, d2, d3
42.	**aqueous titration of weak acids e.g. acetic acid**	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
43.	**aqueous titration of weak bases e.g. ammonium chloride**	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
44.	**non-aqueous titration of weak acids e.g. salicylic acid**	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
45.	**Oxidation/reduction titration (iodometry) ; titration of H_2O_2 using iodine**	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
46.	**Complexiметric titration of calcium salt**	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
47.	**Potentiometric titration of drugs : diclofenac sodium**	**2**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
48.	**Review**	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
Total		**10**	**20 equivalent to 10 credit hours**	
Number of Weeks			**12**	

XIII. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

XV. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: the teacher provides the students with problems related to the studied topics. Every student is assigned to solve some of those problems individually.	c3, c4, d1, d2	4-13	3
2	**Group** : each group of students will be assigned to do a search report on pharmaceutical applications of one method of the studied titrimetric analysis.	c3, c4, d1, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4, b5, b6, b7
		Assignments	7, 12	5	5	c3, c4, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a3, b1, b2, b3, b4
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, b1, b2, b3, b4
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b1, b2, b3, b4, c1, c2, d1, d2,d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	b1, b2, b3, b4, c1, c2, d1, d2,d3
			Total	30	30 %	

XVII. Learning Resources:

1- Required Textbook(s) (maximum two).

David Harvey. Analytical Chemistry 2.1. 2016, DePauw University

2- Essential References.

Leslie G Chatten: Deans analytical chemistry handbook, 2013, McGraw Hill

3- Electronic Materials and Web Sites *etc*.

http://dpuadweb.depauw.edu/harvey_web/eTextProject/AC2.1Files/AnalChem2.1.pdf

XVII. Course Policies:

33.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
34.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
35.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
36.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of **Pharmaceutical Analytical Chemistry I**

I. Course Identification and General Information:

1.	**Course Title:**	**PHARMACEUTICAL ANALYTICAL CHEMISTRY I**			
2.	**Course Code &Number:**	**PHR214**			
3.	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	**3**
4.	**Study level/ semester at which this course is offered:**	*(SECOND) Year – (1ST) semester*			
5.	**Pre –requisite (if any):**	PHR126 **(Pharmaceutical calculations)**			
6.	**Co –requisite (if any):**	**None**			
7.	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
8.	**Language of teaching the course:**	**ENGLISH**			
9.	**Location of teaching the course:**	**At the university facility**			
10	**Prepared by**				
11	**Date of Approval**				

II. Course Description:

The course provides the student with basic knowledge of analysis of substances, including types of qualitative and quantitative analysis, preparation of analytical samples, types of analytical techniques, validation of analysis, and how to avoid the source of errors in analysis. The course also focuses on the concepts and theoretical underpinnings of two types of analysis: titrimetric analysis and electrochemical analysis. The practical part provides the student with the skill of dealing with chemicals, operating analytical instruments, and performing analytical experiments in a chemistry lab. This course is taken in conjunction with another course (Pharmaceutical Organic Chemistry I) to make the student link the concept of analysis and the chemical nature of compounds.

يزود المقرر الطالب بالمعرفة الأساسية لتحليل المواد ويشمل ذلك أنواع التحليل النوعي والكمي وكيفية إعداد العينات التحليلية، وأنواع التقنيات التحليلية، واجراءات التحقق من صحة التحليل، وكيفية تجنب مصدر الأخطاء. كما يركز المقرر الدراسي أيضًا على المفاهيم والأسس النظرية لنوعين من التحليل: التحليل بالمعايرة والتحليل الكهروكيميائي. ويوفر الجزء العملي للطالب مهارة التعامل مع المواد الكيميائية وتشغيل الأجهزة التحليلية وإجراء اختبارات التحليل في معمل الكيمياء. يؤخذ هذا المقرر بالتزامن مع مقرر اخر (الكيمياء العضوية الصيدلانية 1) لجعل الطالب يربط بين مفهوم التحليل والطبيعة الكيميائية للمركبات .

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1**. Explain the physicochemical properties of substances that can be utilized for their qualitative and quantitative analysis
A4	Describe analytical methods, principles, design and development techniques	**a2**. Describe the principles of titrimetric and electrochemical analysis.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist to perform accurate and precise quantitative and qualitative analysis.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret data obtained by titrimetric and electrochemical analysis.
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b2.** Design a suitable titrimetric and electrochemical analysis. based on the substance physicochemical properties.
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b3.** Select appropriate standard operating procedure for titrimetric and electrochemical analysis.
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b4.** Calculate the content % of a material in a sample using titrimetric and electrochemical analysis.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C7	Conduct research and utilize the results in	**c3 .**Search efficiently for information using documented

	different pharmaceutical fields.	and electronic sources of information.
		c4. Present and report his/her works correctly using appropriate writing rules and technologies media.
Intellectual skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge& understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the physicochemical properties of substances that can be utilized for their qualitative and quantitative analysis	**Active Lecture**	**Written exam s**
a2. Describe the principles of titrimetric and electrochemical analysis.		
a3. Describe the role of pharmacist to perform accurate and precise quantitative and qualitative analysis.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret data obtained by titrimetric and electrochemical analysis.	**Active Lecture , laboratory practice, Feed-back learning**	**Written exams, quizzes, lab. term work, practical final exam**
b2. Design a suitable titrimetric and electrochemical analysis. based on the substance physicochemical properties.		
b3. Select appropriate standard operating procedure for titrimetric and electrochemical analysis.		
b4. Calculate the content % of a material in a sample using titrimetric and electrochemical analysis.		

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c4. Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Lab. practice, group-project, feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to analytical chemistry& analytical techniques**	a1,a2, a3, b1, b2, b3, b4	• Definitions, brief history, scope of applications • Quantitative and qualitative analysis (purposes, types) • Validation of analysis ○ Source of errors ○ Sampling procedures. ○ calibration of analytical equipment ○ preparation of standard solutions and calibration curve ○ Analyzing of results: average, SD, coefficient of variation (CV%), accuracy, precision ○ Significant numbers, rejection of doubtful values • Manual versus instrumental analytical techniques: types, advantages , disadvantages.	2	4
2	**Titrimetric analysis (1-Aqueous Acid Base Titration)**	a1,a2, a3, b1, b2, b3, b4	• Types & comparison of titrimetric analysis Definitions • Distribution of acid-base species with pH of the medium. • Acid-Base titrimetry for determination of weakly acidic and basic drugs. • Indicators (theories) and their selection • **applications and solve problems**	2	4
	Titrimetric analysis (2-Non-Aqueous Acid Base titration)	a1,a2, a3, b1, b2, b3, b4	• Theoretical considerations and principles. • Bronsted Lowery of acids and bases. • Non-aqueous solvents. • Titration of weak acids and weak bases. • **Applications and solve problems**	2	4

2	**Titrimetric analysis (3- Oxidation Reduction Titration)**	a1,a2, a3, b1, b2, b3, b4	• Principles and concepts, determination involving oxidizing agents • iodimetric and iodometric determination, miscellaneous oxidation and reduction titrations. Indicators • applications. • chromometric determination, miscellaneous oxidation • Applications and **solve problems**	1	2
	Titrimetric analysis (4- Complexometric Titration)	a1,a2, a3, b1, b2, b3, b4	• Principle, Complexes and chelates, stability of complex ions. • Types of Complexometric titrations. Technique employed in complexometric titration, End point detection • Applications and **solve problems**	2	4
MID-TERM EXAM				1	2
3	**Electrochemical analysis**	a1,a2, a3, b1, b2, b3, b4	• **Electrogravimetric analysis:** Theory of electroanalysis, polarizatuon, decomposition, potential and over voltage electrolytic determination at constant current and with controlled potential at the cathode. • **Conductometry**: experimental details of conductometric titration and applications. • **Potentiometry**: Principles, methods and application. • **Amperometry:** theory and technique of amperometric titration with dropping mercury electrode, high frequency titration, its applications. • **Polarographic analysis**: Introduction, principles, diffusion current and half wave potential, quantitative techniques. • **Applications and solve problems**	4	8
Course Review		a1,a2, a3, b1, b2,	Review	1	3

	b3, b4			
FINAL – EXAM			1	2
TOTAL			16	32
Number of Weeks /and Units Per Semester			16 weeks	4 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	**introduction to the Lab.: safety requirements, list of experiments, How to report, source of errors, etc**	**1**	**2**	c1, c2, d1, d2, d3
2.	**aqueous titration of weak acids e.g. acetic acid**	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
3.	**aqueous titration of weak bases e.g. ammonium chloride**	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
4.	**non-aqueous titration of weak acids e.g. salicylic acid**	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
5.	**Oxidation/reduction titration (iodometry) ; titration of H_2O_2 using iodine**	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
6.	**Complexiметric titration of calcium salt**	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
7.	**Potentiometric titration of drugs : diclofenac sodium**	**2**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
8.	**Review**	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
Total		**10**	**20 equivalent to 10 credit hours**	
Number of Weeks			**12**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: the teacher provides the students with problems related to the studied topics. Every student is assigned to solve some of those problems individually.	c3, c4, d1, d2	4-13	3
2	**Group** : each group of students will be assigned to do a search report on pharmaceutical applications of one method of the studied titrimetric analysis.	c3, c4, d1, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4, b5, b6, b7
		Assignments	7, 12	5	5	c3, c4, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a3, b1, b2, b3, b4
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, b1, b2, b3, b4
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b1, b2, b3, b4, c1, c2, d1, d2,d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	b1, b2, b3, b4, c1, c2, d1, d2,d3
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).
David Harvey. Analytical Chemistry 2.1. 2016, DePauw University
2- Essential References.
Leslie G Chatten: Deans analytical chemistry handbook, 2013, McGraw Hill
3- Electronic Materials and Web Sites *etc*.
http://dpuadweb.depauw.edu/harvey_web/eTextProject/AC2.1Files/AnalChem2.1.pdf

XVIII. Course Policies:

37.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
38.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
39.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
40.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PHARMACEUTICAL ORGANIC CHEMISTRY I

Course Code (**PHR217**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

V. Course Identification and General Information:

122.	**Course Title:**	**Pharmaceutical Organic chemistry I**					
123.	**Course Code &Number:**	**PHR217**					
124.	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		1	1	-	1	-	**3**
125.	**Study level/ semester at which this course is offered:**	*(2ND) Year – (FIRST) semester*					
126.	**Pre –requisite (if any):**						
127.	**Co –requisite (if any):**	**FMS213 (Biochemistry I)**					
128.	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**					
129.	**Language of teaching the course:**	**ENGLISH**					
130.	**Location of teaching the course:**	**At the university facility**					
131.	**Prepared by**						
132.	**Date of Approval**						

L: lecturing; Tut: Tutorial, S: seminar; P: practical; Tr.: training

V. Course Description:

The course is an introduction to specialized pharmacy courses (Medicinal chemistry), as it provides the student with basic knowledge of carbon chemistry from which all organic compounds, including drugs, are derived. The course focuses on uncomplicated organic compounds in terms of their functional chemical groups, chemical composition, physical and chemical properties and their interactions. And methods of preparation and common examples of them, and these compounds include: hydrocarbons. haloalkanes, alcohols, ethers. The practical part also provides the student with the skills necessary to deal with these compounds and perform tests to identify their reactions in the chemistry lab.

يعتبر المقرر مدخلا أساسيا لمقررات صيدلانية متخصصة هي (الكيمياء الدوائية) حيث يوفر للطالب المعرفة الأساسية لكيمياء الكربون التي منها يتم اشتقاق جميع المركبات العضوية بما فيها الأدوية ويركز المقرر على المركبات العضوية غير المعقدة من حيث مجموعاتها الكيميائية الوظيفية وتركيبها الكيميائي وخصائصها الفيزيائية والكيميائية وتفاعلاتها وطرق تحضيرها والأمثلة الشائعة لها، وتشمل تلك المركبات: الهيدروكربونات. هالوألكانات، الكحولات والإيثرات كما يوفر الجزء العملي للطالب المهارات اللازمة للتعامل مع هذه المركبات وإجراء اختبارات التعرف عليها و تفاعلاتها في معمل الكيمياء

III. Intended learning outcomes of the course: (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

3. Alignment of CILOs to PILOs

PILOs		Intended learning outcomes of the course (CILOs)
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Explain the significance of organic chemistry in modern sciences.
A3	Explain physicochemical properties of materials and products	**a2.** Discuss the properties of Carbon atom, models of structural formula, specific properties , mechanisms of reactions and synthesis of uncomplicated organic compounds.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Differentiate, name and draw the chemical structure of organic compounds.
		b2. Relate functional group in organic compounds to the physical and chemical properties of the compounds.
		b3. Predict the catalysts required and the outcomes of a reaction between an organic compound and other chemicals.
B3	Design an evaluate different types of safe and effective drugs, pharmaceutical dosage forms and cosmetic preparations	**b4.** Design a sequence to synthesize an organic compound from a parent compound.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory

C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the significance of organic chemistry in modern sciences.	**Active Lecture**	**Written exams**
a2. Discuss the properties of Carbon atom, models of structural formula, specific properties , mechanisms of reactions and synthesis of uncomplicated organic compounds.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Differentiate, name and draw the chemical structure of organic compounds.	**Active Lecture ,laboratory practice, Feed-back learning**	**Written exams, quizzes, lab. term work, practical final exam**

b4. Design a sequence to synthesize an organic compound from a parent compound.		
b2. Relate functional group in organic compounds to the physical and chemical properties of the compounds.	**Lecture-discussion** **Feed-back learning**	**Written exams, quizzes**
b3. Predict the catalysts required and the outcomes of a reaction between an organic compound and other chemicals.		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c4. Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Lab. practice, group-project, feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**

XIV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	Aligned Course Learning Outcomes	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to organic chemistry**	a1, a2	• definition, brief history • significance of organic chemistry in modern sciences • Carbon chemistry: carbon atomic structure, chemical bonds, atomic Orbitals and electron configuration; sp^3, sp^2, sp hybridization • Physical state • Stereochemistry of organic compounds • isomerism • Resonance • dipole moment • structural theory • Models of Structural formula (all-stick formula, dot formula, dash formula, condensed formula, bond-line formula	3	6
2	**Functional groups & Classification of organic compounds**	a1, a2, b1, b2, b3, b4	• Definition and types of functional groups • classification into categories based on functional groups. • Role of functional group in physical & chemical properties of organic compounds. • Cod1on names Origin • IUPAC Nomenclature priority (which functional group is more important?) • Differences between aliphatic & aromatic organic compounds	3	6
Mid-term exam				1	2

3	**Hydrocarbons**	a1, a2, b1, b2, b3, b4	**(1) Aliphatic** (**Alkanes, Alkenes, Alkynes, cycloalkanes, cycloalkanes)**: definitions, general formula, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, synthesis and reactions (including mechanisms of reactions). **(2) Aromatic hydrocarbon** (definitions, types, general formula, structural models, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, , synthesis and reactions (including mechanisms of reactions).	3	6
4	**Haloalkanes**	a1, a2, b1, b2, b3, b4	• **Aliphatic and aromatic Alkyl halides (Haloalkanes)** and organometallic compounds: (definitions, types, general formula, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, physical properties, synthesis and reactions (including mechanisms of reactions).	2	4
5	**Aliphatic and aromatic Alcohols , ethers and thioethers**	a1, a2, b1, b2, b3, b4	• (definitions, types, general formula, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, synthesis and reactions (including mechanisms of reactions).	4	8
Final exam				1	2
Total				16	32

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Learning Outcomes
49.	Physical properties & Chemical identification of compounds belonging to the following organic groups:			
50.	Hydrocarbons / Haloalkanes.	**2**	**4**	b1, b4, c1, c2, d1, d2, d3
51.	Alcohols	**4**	**8**	b1, b4, c1, c2, d1, d2, d3
52.	Ethers	**2**	**4**	b1, b4, c1, c2, d1, d2, d3
53.	Scheme of identification of organic compounds	**2**	**4**	b1, b4, c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b1, b4, c1, c2, d1, d2, d3
Total		**11**	**22 equivalent to 11 credit hours**	

XIV. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do certain assignments such as sud1arizing, internet search, make charts or solve mathematical problems related to the courses topics. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XVI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	
1	**Individual**: every student is assigned to solve problems at home. The problems are provided by the teacher at the end of each unit. Problems are related to completion of a chemical reaction, nomenclature, draw structures, mechanisms of reactions and others. The student should deliver his/her work every second week in a specific homework booklet. The teacher may ask the student, either personally, or at the class to make sure that the student work belongs to his/her lonely effort.	d1, d2, c3, c4	7	
2	**Group** : each group of students will be assigned to do a search-report about one type the mechanism of a reaction.	d1, d2, d3, c3, c4	12	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4
		Assignments	7, 12	5	5	d1, d2, d3, c3, c4
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, b1, b2, b3, b4
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, b1, b2, b3, b4
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3, b1, b4
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	c1, c2, d2, b1, b4
			Total	30	30 %	

XVIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Xin Liu. Organic chemistry I, 2021, Kwantlen Polytechnic University, Canada

2- Essential References.

McMurry J.E. Fundamentals of Organic Chemistry. 2010, Cengage Learning

3- Electronic Materials and Web Sites *etc*.

https://kpu.pressbooks.pub/organicchemistry/open/download?type=pdf
http://www.cnm.manchester.ac.uk/people/jonathan/CH0001081100.pdf
https://gtu.ge/Agro-Lib/McMurry%20J.E.%20-%20Fundamentals%20of%20Organic%20Chemistry,%207th%20ed.%20-%202010.pdf
http://kgut.ac.ir/useruploads/1615027155168dde.pdf

XIX. Course Policies:

41.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
42.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
43.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
44.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of PHARMACEUTICAL ORGANIC CHEMISTRY I

I. Course Identification and General Information:

1.	Course Title:	Pharmaceutical Organic chemistry I					
2.	Course Code &Number:	**PHR217**					
3.	Credit hours:	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		1	1	-	1	-	**3**
4.	Study level/ semester at which this course is offered:	*(2ND) Year – (FIRST) semester*					
5.	Pre –requisite (if any):						
6.	Co –requisite (if any):	**FMS213 (Biochemistry I)**					
7.	Program (s) in which the course is offered:	**Pharmacy Bachelor**					
8.	Language of teaching the course:	**ENGLISH**					
9.	Location of teaching the course:	**At the university facility**					
10.	Prepared by						
11.	Date of Approval						

II. Course Description:

The course is an introduction to specialized pharmacy courses (Medicinal chemistry), as it provides the student with basic knowledge of carbon chemistry from which all organic compounds, including drugs, are derived. The course focuses on uncomplicated organic compounds in terms of their functional chemical groups, chemical composition, physical and chemical properties and their interactions. And methods of preparation and common examples of them, and these compounds include: hydrocarbons. haloalkanes, . alcohols, ethers. The practical part also provides the student with the skills necessary to deal with these compounds and perform tests to identify their reactions in the chemistry lab.

يعتبر المقرر مدخلا أساسيا لمقررات صيدلانية متخصصة هي (الكيمياء الدوائية) حيث يوفر للطالب المعرفة الأساسية لكيمياء الكربون التي منها يتم اشتقاق جميع المركبات العضوية بما فيها الأدوية ويركز المقرر على المركبات العضوية غير المعقدة من حيث مجموعاتها الكيميائية الوظيفية وتركيبها الكيميائي وخصائصها الفيزيائية والكيميائية وتفاعلاتها وطرق تحضيرها والأمثلة الشائعة لها، وتشمل تلك المركبات: الهيدروكربونات. هالوألكانات، الكحولات والإيثرات كما يوفر الجزء العملي للطالب المهارات اللازمة للتعامل مع هذه المركبات وإجراء اختبارات التعرف عليها و تفاعلاتها في معمل الكيمياء

III. Intended learning outcomes of the course: (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment of CILOs to PILOs

PILOs		Intended learning outcomes of the course (CILOs)
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Explain the significance of organic chemistry in modern sciences.
A3	Explain physicochemical properties of materials and products	**a2.** Discuss the properties of Carbon atom, models of structural formula, specific properties , mechanisms of reactions and synthesis of uncomplicated organic compounds.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Differentiate, name and draw the chemical structure of organic compounds.
		b2. Relate functional group in organic compounds to the physical and chemical properties of the compounds.
		b3. Predict the catalysts required and the outcomes of a reaction between an organic compound and other chemicals.
B3	Design an evaluate different types of safe and effective drugs, pharmaceutical dosage forms and cosmetic preparations	**b4.** Design a sequence to synthesize an organic compound from a parent compound.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory

C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the significance of organic chemistry in modern sciences.	**Active Lecture**	**Written exams**
a2. Discuss the properties of Carbon atom, models of structural formula, specific properties , mechanisms of reactions and synthesis of uncomplicated organic compounds.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Differentiate, name and draw the chemical structure of organic compounds.	**Active Lecture ,laboratory practice, Feed-back learning**	**Written exams, quizzes, lab. term work, practical final exam**
b4. Design a sequence to synthesize an organic compound from a parent compound.		
b2. Relate functional group in organic compounds to the physical and chemical properties of the compounds.	**Lecture-discussion Feed-back learning**	**Written exams, quizzes**
b3. Predict the catalysts required and the outcomes of a reaction between an organic compound and other chemicals.		

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of	**feed-back learning, Group-**	**Assignments**

information.	**project**	
c4. Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Lab. practice, group-project, feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	Aligned Course Learning Outcomes	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to organic chemistry**	a1, a2	• definition, brief history • significance of organic chemistry in modern sciences • Carbon chemistry: carbon atomic structure, chemical bonds, atomic Orbitals and electron configuration; sp^3, sp^2, sp hybridization • Physical state • Stereochemistry of organic compounds • isomerism • Resonance • dipole moment • structural theory • Models of Structural formula (all-stick formula, dot formula, dash formula, condensed formula, bond-line formula	3	6

2	**Functional groups & Classification of organic compounds**	a1, a2, b1, b2, b3, b4	• Definition and types of functional groups • classification into categories based on functional groups. • Role of functional group in physical & chemical properties of organic compounds. • Cod1on names Origin • IUPAC Nomenclature priority (which functional group is more important ?) • Differences between aliphatic & aromatic organic compounds	3	6
Mid-term exam				1	2
3	**Hydrocarbons**	a1, a2, b1, b2, b3, b4	**(3) Aliphatic** (**Alkanes, Alkenes, Alkynes, cycloalkanes, cycloalkanes)**: definitions, general formula, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, synthesis and reactions (including mechanisms of reactions). **(4) Aromatic hydrocarbon** (definitions, types, general formula, structural models, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, , synthesis and reactions (including mechanisms of reactions).	3	6
4	**Haloalkanes**	a1, a2, b1, b2, b3, b4	• **Aliphatic and aromatic Alkyl halides (Haloalkanes)** and organometallic compounds: (definitions, types, general formula, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, physical properties, synthesis and reactions (including mechanisms of reactions).	2	4

5	**Aliphatic and aromatic Alcohols , ethers and thioethers**	a1, a2, b1, b2, b3, b4	• (definitions, types, general formula, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, synthesis and reactions (including mechanisms of reactions).	4	8
Final exam				1	2
Total				16	32

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Learning Outcomes
1.	Physical properties & Chemical identification of compounds belonging to the following organic groups:			
2.	Hydrocarbons / Haloalkanes.	**2**	**4**	b1, b4, c1, c2, d1, d2, d3
3.	Alcohols	**4**	**8**	b1, b4, c1, c2, d1, d2, d3
4.	Ethers	**2**	**4**	b1, b4, c1, c2, d1, d2, d3
5.	Scheme of identification of organic compounds	**2**	**4**	b1, b4, c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b1, b4, c1, c2, d1, d2, d3
Total		**11**	**22 equivalent to 11 credit hours**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do certain assignments such as sud1arizing, internet search, make charts or solve mathematical problems related to the courses topics. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	
1	**Individual**: every student is assigned to solve problems at home. The problems are provided by the teacher at the end of each unit. Problems are related to completion of a chemical reaction, nomenclature, draw structures, mechanisms of reactions and others. The student should deliver his/her work every second week in a specific homework booklet. The teacher may ask the student, either personally, or at the class to make sure that the student work belongs to his/her lonely effort.	d1, d2, c3, c4	7	
2	**Group** : each group of students will be assigned to do a search-report about one type the mechanism of a reaction.	d1, d2, d3, c3, c4	12	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4
		Assignments	7, 12	5	5	d1, d2, d3, c3, c4
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, b1, b2, b3, b4
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, b1, b2, b3, b4
		TOTAL		70	70 %	70

Practical part assessment						
No.	**Assessment Method**		**Week Due**	**Mark**	**Proportion to Total course Assessment**	**Aligned Course Learning Outcomes(CILOs)**
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3, b1, b4
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	c1, c2, d2, b1, b4
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Xin Liu. Organic chemistry I, 2021, Kwantlen Polytechnic University, Canada

2- Essential References.

McMurry J.E. Fundamentals of Organic Chemistry. 2010, Cengage Learning

3- Electronic Materials and Web Sites *etc*.

1- https://kpu.pressbooks.pub/organicchemistry/open/download?type=pdf
2- http://www.cnm.manchester.ac.uk/people/jonathan/CH0001081100.pdf
3- https://gtu.ge/Agro-Lib/McMurry%20J.E.%20-%20Fundamentals%20of%20Organic%20Chemistry,%207th%20ed.%20-%202010.pdf
4- http://kgut.ac.ir/useruploads/1615027155168dde.pdf

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work

5	**Cheating:** Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism:** Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PHYSICAL PHARMACY

Course Code (**PHR216**)

XII. Course Identification and General Information:

13	Course Title:	PHYSICAL PHARMACY					
13	Course Code:	PHR216					
13	Credit hours:	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		1	1	-	1	-	3
13	Study level/ semester at which this course is offered:	*(First) Year – (2ND) semester*					
13	Pre –requisite (if any):	None					
13	Co –requisite (if any):	PHR214 (Phar. Analytical Chemistry I)					
13	Program (s) in which the course is offered:	Pharmacy Bachelor					
14	Language of teaching the course:	ENGLISH					
14	Location of teaching the course:	At the university facility					
14	Prepared by						
14	Date of Approval						

L: lecturing; Tut: Tutorial, S: seminar; P: practical; Tr.: training

II. Course Description:

This course provides the student with knowledge related to physical properties of solid, liquid and gaseous matters and various physical phenomena observed in matters. Moreover, the course deals with stability and degradation of matters and physical interactions that occur between matters. The practical part of the course intends to acquire the student the skills to measure and observe those properties and phenomena. The course also links these properties with their observation or application in pharmacy in particular their correlation or influence on design and formulation of pharmaceutical dosage forms design. Therefore, this course can be referred so as to introduction to "pharmaceutics" courses.

يزود هذا المقرر الطالب بالمعرفة المتعلقة بالخصائص الفيزيائية لحالات المادة المختلفة (صلبة- سائلة- غازية) والظواهر الفيزيائية المختلفة التي يتم ملاحظتها بينها. علاوة على ذلك، يتناول المقرر استقرار وتخرب المواد والتفاعلات الفيزيائية التي تحدث بينها، كما يهدف الجزء العملي من المقرر إلى اكتساب الطالب المهارات اللازمة لقياس ومراقبة تلك الخصائص والظواهر، ويربط المقرر الدراسي أيضًا هذه الخصائص بتطبيقاتها في الصيدلة على وجه الخصوص في تأثيرها على تصميم وصياغة أشكال الجرعات الصيدلانية. لذلك، يمكن اعتبار هذا المقرر كمقدمة لمقررات "الصيدلانيات1 ,2, 3"

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

3. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding : Upon successful completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Show sound understanding of physical properties and phenomena that influence the design of pharmaceutical preparations
Intellectual skills : Upon successful completion of the course, students will be able to:		
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b1.**Apply relevant equations to calculate physical measurements related to formulation and stability of pharmaceutical preparations
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.**Handle efficiently and safely the chemical materials and tools used in the laboratory.
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and measure physical properties successfully in the laboratory.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues and in teacher in the lab..
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

4. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Show sound understanding of physical properties and phenomena that influence the design of pharmaceutical preparations	**Active-lecture**	**written exams**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Apply relevant equations to calculate physical measurements related to formulation and stability of pharmaceutical preparations	**Active-lecture, feed-back learning**	**Written exam, Quizzes, assignment**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory.	**Lab. Practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and measure physical properties successfully in the laboratory.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues and in teacher in the lab..	**Lab. Practice, feed-back learning**	**Lab. term works, assignment**
d2. Demonstrate the skills of time management and self-learning.	**Lab. Practice ,feed-back learning**	**Lab. term works, assignment**
d3. Participate efficiently with his colleagues in a team work.	**Lab. Practice , Group-project**	**Lab. term works, assignment**

XV. Course Content:

A – Theoretical Aspect:

(Definition, types, principle, mathematical expression, measurement (Analysis), factors affecting and pharmaceutical applications of physical properties/phenomena)

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to physical pharmacy**	a1,	• **Scope and purposes** of physical pharmacy • **State of matters:** factors affecting (intermolecular forces, vapor pressure, atmospheric pressure, thermal energy) • **Circle of inter-conversion** of a matter from a state of state; name of processes, internal and external factors	1	2
2	**Physical properties of solid state**	a1, b1	• **Melting point** • **Micrometrics** o Particle size, particle shape o Arrangement of particles: Crystals, amorphous, polymorphism, solvate (hydrates) o Crystallization: principles and applications o Tapped and bulk density and porosity o Flowability: Carr`s index& angle of repose • **Surface Energy &wettability.**	3	6
3	**liquid and gas states physical properties**	a1, b1	• **Thermodynamic liquids:**Evaporation, boiling, vaporization and volatilization • **Vapour pressure** • **Viscosity** • **Surface phenomena:** Surface tension, interfacial tension	3	6
MID-TERM EXAM				1	2

4	**Physical interactions between matters**	a1, b1	• **Bulk Interactions** o Dissolution; solubility , miscibility; o Dispersion , Solubilization,& Critical micelles concentration; types and roles of surfactants; factors reducing surfactant activity o Partition coefficient : Hydrophilicity and lipophilicity and role of pH • **Surface interactions** - Adsorption - Complexation • **Transfer of matter:** Diffusion • **Incompatibility**	4	8
5	**Stability and Degradation**	a1, b1	• **Concept of stability** - Definition and types of degradation - Definition and types of stability - Causes of degradation - Stabilizers and other approaches to reduce degradation • **Kinetics of stability** - Order of degradation (zero, first, second): equations, rate constants, half-life • Stability determination: accelerated, long-term, shelf life (t_{10})	3	6
Course Review		a1, b1	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	5 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	AlignedCourse Intended Learning Outcomes CILOs
1.	Melting point determination by capillary method	**1**	**2**	c1, c2, d1, d2
2.	Particle size analysis (sieve and sedimentation method)	**1**	**2**	c1, c2, d1, d2
3.	Crystallization : preparation of salicylic acid crystals	**1**	**2**	c1, c2, d1, d2
4.	Tapped and bulk density porosity and Carr`s index of flowability description ..	**1**	**2**	c1, c2, d1, d2, d3
5.	Viscosity determination (Ostwald tube)	**1**	**2**	c1, c2, d1, d2, d3
6.	Surface tension determination (Capillary or Drop weight method)	**1**	**2**	c1, c2, d1, d2, d3
7.	Critical micelles concentration (CMC)determination	**1**	**2**	c1, c2, d1, d2, d3
8.	Partition coefficient determination (salicylic acid between water & ether)	**1**	**2**	c1, c2, d1, d2, d3
9.	Review	**1**	**2**	c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	c1, c2, d1, d2
Total		**10**	**20**	

XV. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, home-works, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XVII. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: the teacher provide the students with mathematical problems related to the studied topics. Every student is assigned to solve some of those problems individually.	b1, d2	4-13	3
2	**Group** : each group of students will be assigned to make a search-report supported by illustrating videos on one of the studied physical phenomenon.	d1, d1, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1
		Assignments	7, 12	5	5	b1, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, b1
3	Final exam of theoretical part (written exam)		16	50	50	a1, b1
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	c1, c2,d1, d2
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Martin`s : Physical pharmacy and pharmaceutical sciences, 2015, Lippincott Williams & Wilkins, UK

2- Essential References.

1. Aulton M.E., Pharmaceutics: the science of dosage form design, 2016, Churchill Livingstone, UK
2. Subrahmanyam. A text book of physical pharmaceutics, 2015, Vallabh Prakashan, India

3- Electronic Materials and Web Sites *etc*.

https://toaz.info/doc-view

XX. Course Policies:

45.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
46.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
47.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
48.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

PHYSICAL PHARMACY

I. Course Identification and General Information:

1.	Course Title:	PHYSICAL PHARMACY					
2.	Course Code:	PHR216					
3.	Credit hours:	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		1	1	-	1	-	3
4.	Study level/ semester at which this course is offered:	(First) Year – (2ND) semester					
5.	Pre –requisite (if any):	None					
6.	Co –requisite (if any):	PHR214 (Phar. Analytical Chemistry I)					
7.	Program (s) in which the course is offered:	Pharmacy Bachelor					
8.	Language of teaching the course:	ENGLISH					
9.	Location of teaching the course:	At the university facility					
10	Prepared by						
11	Date of Approval						

II. Course Description:

This course provides the student with knowledge related to physical properties of solid, liquid and gaseous matters and various physical phenomena observed in matters. Moreover, the course deals with stability and degradation of matters and physical interactions that occur between matters. The practical part of the course intends to acquire the student the skills to measure and observe those properties and phenomena. The course also links these properties with their observation or application in pharmacy in particular their correlation or influence on design and formulation of pharmaceutical dosage forms design. Therefore, this course can be referred so as to introduction to "pharmaceutics" courses.

يزود هذا المقرر الطالب بالمعرفة المتعلقة بالخصائص الفيزيائية لحالات المادة المختلفة (صلبة- سائلة- غازية) والظواهر الفيزيائية المختلفة التي يتم ملاحظتها بينها. علاوة على ذلك، يتناول المقرر استقرار وتخرب المواد والتفاعلات الفيزيائية التي تحدث بينها، كما يهدف الجزء العملي من المقرر إلى اكتساب الطالب المهارات اللازمة لقياس ومراقبة تلك الخصائص والظواهر، ويربط المقرر الدراسي أيضًا هذه الخصائص بتطبيقاتها في الصيدلة على وجه الخصوص في تأثيرها على تصميم وصياغة أشكال الجرعات الصيدلانية. لذلك ، يمكن اعتبار هذا المقرر كمقدمة لمقررات "الصيدلانيات1 ,2, 3"

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding : Upon successful completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Show sound understanding of physical properties and phenomena that influence the design of pharmaceutical preparations
Intellectual skills : Upon successful completion of the course, students will be able to:		
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b1.**Apply relevant equations to calculate physical measurements related to formulation and stability of pharmaceutical preparations
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.**Handle efficiently and safely the chemical materials and tools used in the laboratory.
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and measure physical properties successfully in the laboratory.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues and in teacher in the lab..
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Show sound understanding of physical properties and phenomena that influence the design of pharmaceutical preparations	**Active-lecture**	**written exams**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Apply relevant equations to calculate physical measurements related to formulation and stability of pharmaceutical preparations	**Active-lecture, feed-back learning**	**Written exam, Quizzes, assignment**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory.	**Lab. Practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and measure physical properties successfully in the laboratory.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues and in teacher in the lab..	**Lab. Practice, feed-back learning**	**Lab. term works, assignment**
d2. Demonstrate the skills of time management and self-learning.	**Lab. Practice, feed-back learning**	**Lab. term works, assignment**
d3. Participate efficiently with his colleagues in a team work.	**Lab. Practice, Group-project**	**Lab. term works, assignment**

IV. Course Content:

A – Theoretical Aspect:

(Definition, types, principle, mathematical expression, measurement (Analysis), factors affecting and pharmaceutical applications of physical properties/phenomena)

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to physical pharmacy**	a1,	• **Scope and purposes** of physical pharmacy • **State of matters:** factors affecting (intermolecular forces, vapor pressure, atmospheric pressure, thermal energy) • **Circle of inter-conversion** of a matter from a state of state; name of processes, internal and external factors	1	2
2	**Physical properties of solid state**	a1, b1	• **Melting point** • **Micrometrics** o Particle size, particle shape o Arrangement of particles: Crystals, amorphous, polymorphism, solvate (hydrates) o Crystallization: principles and applications o Tapped and bulk density and porosity o Flowability : Carr`s index& angle of repose • **Surface Energy &wettability.**	3	6
3	**liquid and gas states physical properties**	a1, b1	• **Thermodynamic liquids:**Evaporation, boiling, vaporization and volatilization • **Vapour pressure** • **Viscosity** • **Surface phenomena:** Surface tension, interfacial tension	3	6
MID-TERM EXAM				1	2

4	**Physical interactions between matters**	a1, b1	• **Bulk Interactions** o Dissolution; solubility, miscibility; o Dispersion, Solubilization, & Critical micelles concentration; types and roles of surfactants; factors reducing surfactant activity o Partition coefficient: Hydrophilicity and lipophilicity and role of pH • **Surface interactions** - Adsorption - Complexation • **Transfer of matter:** Diffusion • **Incompatibility**	4	8
5	**Stability and Degradation**	a1, b1	• **Concept of stability** - Definition and types of degradation - Definition and types of stability - Causes of degradation - Stabilizers and other approaches to reduce degradation • **Kinetics of stability** - Order of degradation (zero, first, second): equations, rate constants, half-life • Stability determination: accelerated, long-term, shelf life (t_{10})	3	6
Course Review		a1, b1	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	5 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	AlignedCourse Intended Learning Outcomes CILOs
1.	Melting point determination by capillary method	**1**	**2**	c1, c2, d1, d2
2.	Particle size analysis (sieve and sedimentation method)	**1**	**2**	c1, c2, d1, d2
3.	Crystallization : preparation of salicylic acid crystals	**1**	**2**	c1, c2, d1, d2
4.	Tapped and bulk density porosity and Carr`s index of flowability description ..	**1**	**2**	c1, c2, d1, d2, d3
5.	Viscosity determination (Ostwald tube)	**1**	**2**	c1, c2, d1, d2, d3
6.	Surface tension determination (Capillary or Drop weight method)	**1**	**2**	c1, c2, d1, d2, d3
7.	Critical micelles concentration (CMC)determination	**1**	**2**	c1, c2, d1, d2, d3
8.	Partition coefficient determination (salicylic acid between water & ether)	**1**	**2**	c1, c2, d1, d2, d3
9.	Review	**1**	**2**	c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	c1, c2, d1, d2
Total		**10**	**20**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, home-works, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: the teacher provide the students with mathematical problems related to the studied topics. Every student is assigned to solve some of those problems individually.	b1, d2	4-13	3
2	**Group** : each group of students will be assigned to make a search-report supported by illustrating videos on one of the studied physical phenomenon.	d1, d1, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1
		Assignments	7, 12	5	5	b1, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, b1
3	Final exam of theoretical part (written exam)		16	50	50	a1, b1
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	c1, c2,d1, d2
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Martin`s : Physical pharmacy and pharmaceutical sciences, 2015, Lippincott Williams & Wilkins, UK

2- Essential References.

1. Aulton M.E., Pharmaceutics: the science of dosage form design, 2016, Churchill Livingstone, UK
2. Subrahmanyam. A text book of physical pharmaceutics, 2015, Vallabh Prakashan, India

3- Electronic Materials and Web Sites *etc*.

https://toaz.info/doc-view

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PHYSIOLOGY I

Course Code (**FMS215**)

XIII. Course Identification and General Information:

14	**Course Title:**	**PHYSIOLOGY I**					
14	**Course Code:**	**FMS215**					
14	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
14	**Study level/ semester at which this course is offered:**	*(2ND) Year – (1ST) semester*					
14	**Pre –requisite (if any):**	**None**					
14	**Co –requisite (if any):**	**FMS212 (Anatomy)**					
15	**Program (s) in which the course is offered:**	**All Bachelor programs in the faculty of Medical sciences**					
15	**Language of teaching the course:**	**ENGLISH**					
15	**Location of teaching the course:**	**At the university facility**					
15	**Prepared by**						
15	**Date of Approval**						

L: lecturing; Tut: Tutorial, S: seminar; P: practical; Tr.: training

XIV. Course Description:

The course is designed to provide the student basic knowledge in the mechanisms of normal body functions such as homeostasis and feedback mechanisms. It also concerns with normal processes in the cells such as transport of materials trough the cell membrane, membrane potential and cell repair and the composition and regulations of Body fluids, electrolytes and acid-base balance. Moreover, the course provides knowledge in functions and regulations of vital organs/systems in the body including: nervous system, endocrine and muscles. The practical part provides the student with skills to measure biological signs related to nerves and muscles

تم تصميم هذا المقرر الدراسي لتزويد الطالب بالمعرفة والمهارات الأساسية في آليات وظائف الجسم الطبيعية مثل آليات الاستتباب والتغذية الراجعة. كما يهتم المقرر بالعمليات الطبيعية في الخلايا مثل نقل المواد عبر غشاء الخلية قرق الجهد في الغشاء وإصلاح الخلية وتكوين وتنظيم سوائل الجسم والأملاح والتوازن الحمضي القاعدي. علاوة على ذلك ، يوفر المقرر المعرفة في تنظيم وظائف أنظمة أجهزة الجسم الحيوية كالجهاز العصبي والغدد الصماء والعضلات و يزود الجزء العملي الطالب بمهارات قياس العلامات الحيوية ذات الصلة بالأعصاب و العضلات

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

5. Alignment CILOs to PILOs

Knowledge & understanding: Upon successful completion of the course, students will be able to:

PILOs		CILOs
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Discuss the concept of homeostasis and feedback mechanisms observed in normal functions of human body organs.
		a2. . Identify the mechanisms of transport of material into and out of human cells.
		a3. Determine the normal functions and regulation of nervous system, endocrine glands and muscles.
		a4. Explain the biological role of certain endogenous substances in regulation the normal functions of nervous system, endocrine glands and muscles.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.**Identify the signs of normal functions of nervous system, endocrine glands and muscles.
		b2. Interpret the outcomes of normal functions of nervous system, endocrine glands and muscles.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle safely and effectively the materials in physiology Lab
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2**. Operate effectively the instruments in physiology lab. to measure biological signs.

C7	Conduct research and utilize the results in different pharmaceutical	**c3 .**Search efficiently for information using documented and electronic sources of information.

	fields.	**c4.** Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d2.** Participate efficiently with his colleagues in a team work.

6. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Discuss the concept of homeostasis and feedback mechanisms observed in normal functions of human body organs.	**Active Lecture**	**written exams**
a2. . Identify the mechanisms of transport of material into and out of human cells.		
a3. Determine the normal functions and regulation of nervous system, endocrine glands and muscles.		
a4. Explain the biological role of certain endogenous substances in regulation the normal functions of nervous system, endocrine glands and muscles.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Identify the signs of normal functions of nervous system, endocrine glands and muscles.	**Active Lecture, Feed-back learning, Group-project.**	**Written exam, quizzes, assignments**
b2. Interpret the outcomes of normal functions of nervous system, endocrine glands and muscles.		

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment

		Strategies
c1. Operate effectively the instruments in physiology lab. to measure biological signs.	**Lab. practice**	**Lab. term works, final practical exam**
c2 . Search efficiently for information using documented and electronic sources of information.	**Feed-back learning, Group-project**	**Assignments**
c3 . Search efficiently for information using documented and electronic sources of information.		
c4. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the skills of time management and self-learning.	**Group-project , feed-back learning**	**Assignment**
d2. Participate efficiently with his colleagues in a team work.		

XVI. Course Content:

A. Theoretical aspect

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, a2, a3, a4, b1, b2	physiology definition, the concept of homeostasis. Negative feedback.	1	2
2	**The Cell and body fluids physiology**	a1, a2, a3, a4, b1, b2	• structure, functions, membrane transport mechanisms: (passive diffusion , mediated transport, osmosis) • membrane potential(resting, action) • Cell repair : mechanisms. • Composition and regulations of Body fluids, electrolytes and acid-base balance	2	4
3	**The Nervous system**	a1, a2, a3, a4, b1, b2	• Classification of nervous system • classes of neurons • Synaptic transmission (chemical synapsis, summation, interconnection between neurons, factors affecting the transmission)	1	2
4	**Central nervous system (CNS) Part (1)**	a1, a2, a3, a4, b1, b2	• Components of CNS • level of CNS functions • functions of brain composition (cerebrum, cerebral cortex, etc.), • blood brain barrier • spinal cord (function, composition, spinal reflex, cerebrospinal fluid)	2	4
MID-TERM EXAM				1	2
4	**Central nervous system (CNS) Part (2)**	a1, a2, a3, a4, b1, b2	• Sensation: nociception, hyperalgesia, pain pathway, neurotransmitters of pain, types of pain (cutaneous, visceral, deep, referred, phantom), endogenous analgesic system • Regulating areas in brain (function, neurotransmitters):	2	4

			nociception area, psychic area, heat regulating center, area controlling muscles relaxation and contraction vasomotor center, Chemoreceptor trigger zone and other areas involved in diseases.		
5	**Autonomic nervous system**	a1, a2, a3, a4, b1, b2	• definition and composition & regulation • sympathetic system (functions, neurotransmitters, receptors), adrenal medulla, • parasympathetic system (functions, neurotransmitters, receptors)	2	4
6	**Endocrine system**	a1, a2, a3, a4, b1, b2	• hormones (biochemical classification, transport, mechanism of actions) • functions and regulation of • hormones of (pituitary gland, thyroid gland, parathyroid gland, pancreas, sex organs)	2	4
7	**Muscles**	a1, a2, a3, a4, b1, b2	• types, functions • factors affecting contraction and relaxation	1	2
Course Review		a3, a4, , , ,d1, d2	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

B- Practical aspect

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Intended Learning Outcomes CILOs
54.	Introduction to Physiology Lab.	**1**	**2**	c1, c2, d1, d2
55.	Nerve conduction study	**1**	**2**	c1, c2, d1, d2
56.	Examination of the peripheral nervous system	**1**	**2**	c1, c2, d1, d2
57.	Examination of the eye (visual illusion, field of vision	**1**	**2**	c1, c2, d1, d2
58.	Test of chemical senses	**1**	**2**	c1, c2, d1, d2
59.	Nervous Reaction time	**1**	**4**	c1, c2, d1, d2
60.	Hand grip strength and fatigue time	**1**	**2**	c1, c2, d1, d2
PRACTICAL EXAM		**1**	**2**	c1, c2
Total		**8**	**16**	

XVI. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation.

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XVIII. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to do a search on one endogenous mediator that is involved in one of the physiological studied and provide a summary report on it.	b1, b2, c1, c2, d1, d2	4-13	6
2	**Group** : each group of students will be assigned to do a search on one of the physiological processes studied and make a summary report.	b1, b2, c1, c2, d1, d2	14	4

VII. Schedule of Assessment Tasks for Students During the Semester

A- Theoretical part

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2
		Assignments	7, 12	5	5	b1, b2, c1, c2, d1, d2
2	Mid-semester exam (written exam)		7	10	10	10
3	Final exam of (written exam)		16	50	50	50
			TOTAL	70	70 %	

Practical part assessment						
No.	**Assessment Method**		**Week Due**	**Mark**	**Proportion to Total course Assessment**	**Aligned Course Learning Outcomes(CILOs)**
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	
			Total	30	30 %	

XIX. Learning Resources:

1- Required Textbook(s) (maximum two).

John E. Hall and Arthur C. Guyton. Guyton and Hall Textbook of Medical Physiology. 2010, Elsevier Health Sciences

2- Essential References.

Anne Waugh and Allison Grant · Ross & Wilson Anatomy and Physiology in Health and Illness. 2018., Elsevier Health Sciences

3- Electronic Materials and Web Sites *etc*.

1. http://course.sdu.edu.cn/G2S/Template/View.aspx?courseId=1546&topMenuId=157644&action=view&type=&name=&menuType=1

2- https://assets.openstax.org/oscms-prodcms/media/documents/AnatomyandPhysiology-OP.pdf

3- http://repo.jfn.ac.lk/med/bitstream/701/830/1/Manual%20for%20Medical%20Phys%20Pract%202014.pdf

XXI. Course Policies:	
49.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
50.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
51.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
52.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of **PHYSIOLOGY I**

I. Course Identification and General Information:

1.	**Course Title:**	**PHYSIOLOGY I**					
2.	**Course Code:**	**FMS215**					
3.	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
4.	**Study level/ semester at which this course is offered:**	*(2ND) Year – (1ST) semester*					
5.	**Pre –requisite (if any):**	**None**					
6.	**Co –requisite (if any):**	**FMS212 (Anatomy)**					
7.	**Program (s) in which the course is offered:**	**All Bachelor programs in the faculty of Medical sciences**					
8.	**Language of teaching the course:**	**ENGLISH**					
9.	**Location of teaching the course:**	**At the university facility**					
10	**Prepared by**						
11	**Date of Approval**						

II. Course Description:

The course is designed to provide the student basic knowledge in the mechanisms of normal body functions such as homeostasis and feedback mechanisms. It also concerns with normal processes in the cells such as transport of materials trough the cell membrane, membrane potential and cell repair and the composition and regulations of Body fluids, electrolytes and acid-base balance. Moreover, the course provides knowledge in functions and regulations of vital organs/systems in the body including: nervous system, endocrine and muscles. The practical part provides the student with skills to measure biological signs related to nerves and muscles

تم تصميم هذا المقرر الدراسي لتزويد الطالب بالمعرفة والمهارات الأساسية في آليات وظائف الجسم الطبيعية مثل آليات الاستتباب والتغذية الراجعة. كما يهتم المقرر بالعمليات الطبيعية في الخلايا مثل نقل المواد عبر غشاء الخلية قرق الجهد في الغشاء وإصلاح الخلية وتكوين وتنظيم سوائل الجسم والأملاح والتوازن الحمضي القاعدي. علاوة على ذلك ، يوفر المقرر المعرفة في تنظيم وظائف أنظمة أجهزة الجسم الحيوية كالجهاز العصبي والغدد الصماء والعضلات و يزود الجزء العملي الطالب بمهارات قياس العلامات الحيوية ذات الصلة بالأعصاب و العضلات

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

Knowledge & understanding: Upon successful completion of the course, students will be able to:

PILOs		CILOs
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Discuss the concept of homeostasis and feedback mechanisms observed in normal functions of human body organs.
		a2. . Identify the mechanisms of transport of material into and out of human cells.
		a3. Determine the normal functions and regulation of nervous system, endocrine glands and muscles.
		a4. Explain the biological role of certain endogenous substances in regulation the normal functions of nervous system, endocrine glands and muscles.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.**Identify the signs of normal functions of nervous system, endocrine glands and muscles.
		b2. Interpret the outcomes of normal functions of nervous system, endocrine glands and muscles.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle safely and effectively the materials in physiology Lab
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2**. Operate effectively the instruments in physiology lab. to measure biological signs.

C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d2.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Discuss the concept of homeostasis and feedback mechanisms observed in normal functions of human body organs.	**Active Lecture**	**written exams**
a2. . Identify the mechanisms of transport of material into and out of human cells.		
a3. Determine the normal functions and regulation of nervous system, endocrine glands and muscles.		
a4. Explain the biological role of certain endogenous substances in regulation the normal functions of nervous system, endocrine glands and muscles.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Identify the signs of normal functions of nervous system, endocrine glands and muscles.	**Active Lecture, Feed-back learning, Group-project.**	**Written exam, quizzes, assignments**
b2. Interpret the outcomes of normal functions of nervous system, endocrine glands and muscles.		

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Operate effectively the instruments in physiology lab. to measure biological signs.	**Lab. practice**	**Lab. term works, final practical exam**
c2 . Search efficiently for information using documented and electronic sources of information.	**Feed-back learning, Group-project**	**Assignments**
c3 . Search efficiently for information using documented and electronic sources of information.		
c4. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the skills of time management and self-learning.	**Group-project, feed-back learning**	**Assignment**
d2. Participate efficiently with his colleagues in a team work.		

IV. Course Content:

A. Theoretical aspect

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, a2, a3, a4, b1, b2	physiology definition, the concept of homeostasis. Negative feedback.	1	2
2	**The Cell and body fluids physiology**	a1, a2, a3, a4, b1, b2	• structure, functions, membrane transport mechanisms: (passive diffusion, mediated transport, osmosis) • membrane potential (resting, action) • Cell repair: mechanisms. • Composition and regulations of Body fluids, electrolytes and acid-base balance	2	4
3	**The Nervous system**	a1, a2, a3, a4, b1, b2	• Classification of nervous system • classes of neurons • Synaptic transmission (chemical synapsis, summation, interconnection between neurons, factors affecting the transmission)	1	2
4	**Central nervous system (CNS) Part (1)**	a1, a2, a3, a4, b1, b2	• Components of CNS • level of CNS functions • functions of brain composition (cerebrum, cerebral cortex, etc.), • blood brain barrier • spinal cord (function, composition, spinal reflex, cerebrospinal fluid)	2	4
MID-TERM EXAM				1	2
4	**Central nervous system (CNS) Part (2)**	a1, a2, a3, a4, b1, b2	• Sensation: nociception, hyperalgesia, pain pathway, neurotransmitters of pain, types of pain (cutaneous, visceral, deep, referred, phantom) , endogenous analgesic system • Regulating areas in brain (function, neurotransmitters): nociception area, psychic area,	2	4

			heat regulating center, area controlling muscles relaxation and contraction vasomotor center, Chemoreceptor trigger zone and other areas involved in diseases.		
5	**Autonomic nervous system**	a1, a2, a3, a4, b1, b2	• definition and composition & regulation • sympathetic system (functions, neurotransmitters, receptors), adrenal medulla, • parasympathetic system (functions, neurotransmitters, receptors)	2	4
6	**Endocrine system**	a1, a2, a3, a4, b1, b2	• hormones (biochemical classification, transport, mechanism of actions) • functions and regulation of • hormones of (pituitary gland, thyroid gland, parathyroid gland, pancreas, sex organs)	2	4
7	**Muscles**	a1, a2, a3, a4, b1, b2	• types, functions • factors affecting contraction and relaxation	1	2
Course Review		a3, a4, , , ,d1, d2	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

B- Practical aspect

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Intended Learning Outcomes CILOs
1.	Introduction to Physiology Lab.	**1**	**2**	c1, c2, d1, d2
2.	Nerve conduction study	**1**	**2**	c1, c2, d1, d2
3.	Examination of the peripheral nervous system	**1**	**2**	c1, c2, d1, d2
4.	Examination of the eye (visual illusion, field of vision	**1**	**2**	c1, c2, d1, d2
5.	Test of chemical senses	**1**	**2**	c1, c2, d1, d2
6.	Nervous Reaction time	**1**	**4**	c1, c2, d1, d2
7.	Hand grip strength and fatigue time	**1**	**2**	c1, c2, d1, d2
PRACTICAL EXAM		**1**	**2**	c1, c2
Total		**8**	**16**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation.

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to do a search on one endogenous mediator that is involved in one of the physiological studied and provide a summary report on it.	b1, b2, c1, c2, d1, d2	4-13	6
2	**Group** : each group of students will be assigned to do a search on one of the physiological processes studied and make a summary report.	b1, b2, c1, c2, d1, d2	14	4

VII. Schedule of Assessment Tasks for Students During the Semester

A- Theoretical part

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2
		Assignments	7, 12	5	5	b1, b2, c1, c2, d1, d2
2	Mid-semester exam (written exam)		7	10	10	10
3	Final exam of (written exam)		16	50	50	50
			TOTAL	70	70 %	

Practical part assessment						
No.	**Assessment Method**		**Week Due**	**Mark**	**Proportion to Total course Assessment**	**Aligned Course Learning Outcomes(CILOs)**
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	c1, c2
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

John E. Hall and Arthur C. Guyton. Guyton and Hall Textbook of Medical Physiology. 2010, Elsevier Health Sciences

2- Essential References.

Anne Waugh and Allison Grant · Ross & Wilson Anatomy and Physiology in Health and Illness. 2018., Elsevier Health Sciences

3- Electronic Materials and Web Sites *etc*.

1. http://course.sdu.edu.cn/G2S/Template/View.aspx?courseId=1546&topMenuId=157644&action=view&type=&name=&menuType=1

2- https://assets.openstax.org/oscms-prodcms/media/documents/AnatomyandPhysiology-OP.pdf

3- http://repo.jfn.ac.lk/med/bitstream/701/830/1/Manual%20for%20Medical%20Phys%20Pract%202014.pdf

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

BIOCHEMISTRY II

Course Code (**FMS221**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XV. Course Identification and General Information:

15	**Course Title:**	**BIOCHEMISTRY II**					
15	**Course Code &Number:**	**FMS221**					
15	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
15	**Study level/ semester at which this course is offered:**	*(2nd) Year – (2nd) semester*					
15	**Pre –requisite (if any):**	**FMS213 (biochemistry I)**					
16	**Co –requisite (if any):**	**PHR225 (Phar. Organic chemistry II)**					
16	**Program (s) in which the course is offered:**	**All Bachelor programs offered by the faculty of medical sciences**					
16	**Language of teaching the course:**	**ENGLISH**					
16	**Location of teaching the course:**	**At the university facility**					
16	**Prepared By:**						
16	**Date of Approval**						

L: lecturing; Tut: Tutorial, S: seminar; P: practical; Tr.: training

XVI. Course Description:

This course is complementary to (biochemistry I). The course provide the students with knowledge of types, regulation, chemical structure, biosynthesis, metabolic pathways and physiological/pathological roles of biochemical compounds including enzymes, nucleic acids and hormones and also types, chemical properties, functions and fate in the body as well as pathological conditions resulted from disturbance of exogenous supplements including vitamins and minerals. The practical part provides the student skills of analysis of those compounds in vitro and bioassay them in biological specimens.

هذا المقرر هو الجزء الثاني المكمل لمقرر (الكيمياء الحيوية 1) ويزود الطلاب بمعرفة أنواع وتنظيم وتركيب الكيميائي والتخليق الحيوي والمسارات الأيضية والأدوار الفسيولوجية / المرضية للمركبات الكيميائية الحيوية بما في ذلك الإنزيمات والأحماض النووية والهرمونات وأيضًا الأنواع والخصائص الكيميائية والوظائف والمنتهى في الجسم وكذلك الحالات المرضية عن اضطراب ما يسمى بالمكملات الخارجية بما في ذلك الفيتامينات والمعادن. كما يوفر الجزء العملي لطالب مهارات تحليل تلك المركبات في المختبر واختبارها في العينات الحيوية

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

3. Alignment CILOs to PILOs

PILOs		CILOs
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Identify the roles of biochemical compounds, vitamins and minerals in human body.
		a2. Explicit the physiological/pathological involvement of enzymes, nucleic acids and hormones, vitamins and minerals.
A3	Explain physicochemical properties of materials and products	**a3**. Explain the physicochemical properties of carbohydrates, proteins and lipids..
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret body diseases resulted from disturbances in levels of enzymes, nucleic acids and hormones, vitamins and minerals.
		b2. Predict the outcomes of biochemical reactions involving enzymes, nucleic acids and hormones, vitamins and minerals.
		b3. Compare between metabolic reactions of enzymes, nucleic acids and hormones, vitamins and minerals.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b4.** Select standard operation procedure for isolation of enzymes, nucleic acids and hormones, vitamins and minerals from blood.
		b5. Choose a method for identification of enzymes, nucleic acids and hormones, vitamins and minerals.

C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory.
C3	**C3.** Screen for drugs from different sources and carry out pharmacy relevant experiments successfully.	**c3 .**Bioassay enzymes, nucleic acids and hormones, vitamins and minerals in blood.
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c4 .**Search efficiently for information using documented and electronic sources of information.
		c5. Present and report his/her works correctly using appropriate writing rules and technologies media.
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

4. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the roles of biochemical compounds, vitamins and minerals in human body.	**Active Lecture, laboratory practice**	**written exams , Lab. term work, final practical exam**
a2. Explicit the physiological/pathological involvement of enzymes, nucleic acids and hormones, vitamins and minerals.		
a3. Explain the physicochemical properties of carbohydrates, proteins and lipids..		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret body diseases resulted from disturbances in levels of enzymes, nucleic acids and hormones, vitamins and minerals.	**Active lecture, feed-back learning**	**Written exam, quizzes**
b2. Predict the outcomes of biochemical reactions involving enzymes, nucleic acids and hormones, vitamins and minerals.		
b3. Compare between metabolic reactions of enzymes, nucleic acids and hormones, vitamins and minerals.		
b4. Select standard operation procedure for isolation of enzymes, nucleic acids and hormones, vitamins and minerals from blood.	**Active Lecture, , feed-back learning, Lab. practice**	**written exam , quizzes, Lab. term work, final practical exam**
b5. Choose a method for identification of enzymes, nucleic acids and hormones, vitamins and minerals.		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**Lab. Practice**	**Lab. term work, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory.		
c3 . Bioassay enzymes, nucleic acids and hormones, vitamins and minerals in blood.		
c4 . Search efficiently for information using documented and electronic sources of information.	**Group-project, feed-back learning**	**Assignment**
c5. Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skillsto Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**Group-project , Lab. practice**	**Assignment s, Lab. term work, final practical exam**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Feed-back learning , Lab. practice**	**Assignment s, Lab. term work, final practical exam**

XVII. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Nucleic acids**	a1, a2, a3, b1, b2, b3, b4,b5	• Basic structures • Types (DNA, RNA), roles, biosynthesis and catabolism • DNA replication and mutation • DNA repair mechanism	2	4
2	**Enzymes**	a1, a2, a3, b1, b2, b3, b4,b5	• Classifications and physiological roles • Nomenclature • Factors affecting enzyme action • Enzyme kinetics • Cytochrome P450 enzymes: classification, roles, stimulation and inhibition • Pathological conditions related to enzymes.	4	8
MID-TERM EXAM				1	2
3	**Hormones and related factors**	a1, a2, a3, b1, b2, b3, b4,b5	Classification, chemical structures, biosynthesis, catabolism and Pathological conditions related to: • Anterior Pituitary gland hormones • Posterior pituitary gland hormones • Corticosteroids • Thyroxin • Insulin • Sex hormones • Others	5	10
4	**Vitamins & minerals & trace elements**	a1, a2, a3, b1, b2, b3, b4,b5	• Vitamins: Classifications, physiological/pathological roles. Sources, chemical structures, absorption, distribution, metabolic pathways. elimination, daily requirements • Minerals and trace elements: physiological/pathological roles.	3	6

			Sources, salts, absorption, distribution, metabolic pathways. elimination, daily requirements		
Course Review		a1, a2, a3, b1, b2, b3, b4,b5	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	4 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	Isolation of DNA from saliva human sample	**1**	2	b4, b5, c1, c2, c3, d1, d2, d3
2.	Identification, isolation and bioassay of liver-related enzymes in blood	**2**	**4**	b4, b5, c1, c2, c3, d1, d2, d3
3.	Identification, isolation and bioassay of Myocardial infarction-related enzymes in blood	**1**	4	b4, b5, c1, c2, c3, d1, d2, d3
4.	bioassay of thyroid hormones	**1**	2	b4, b5, c1, c2, c3, d1, d2, d3
5.	bioassay of sex hormones : testosterone, estrogen in blood	**2**	4	b4, b5, c1, c2, c3, d1, d2, d3
6.	Identification, isolation and bioassay of minerals in urine	**1**	2	b4, b5, c1, c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
Total		**9**	**18**	

XVII. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XIX. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: the teacher provide the students with biochemical problems related to the studied topics. Every student is assigned to solve some of those problems individually.	d2, c4, c5	4-13	3
2	**Group** : each group of students will be assigned to present a search report on one pathological condition related to disturbances in biochemical levels in the body.	d1, d2, d3, c4, c5	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4, b5
		Assignments	7, 12	5	5	c3, c4, d1, d2, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2, a3, b1, b2, b3, b4, b5
3	Final exam (written exam)		16	50	50	a1, a2, a3, b1, b2, b3, b4, b5
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b4, b5, c1, c2,c3, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	b4, b5, c1, c2,c3, d1, d2, d3
			Total	30	30 %	

XX. Learning Resources:

1- Required Textbook(s) (maximum two).

2. Kevin Ahern. Biochemistry free for all. 2018, Oregon State University

2- Essential References.

2. Pamela C. Champe, Lippincott's illustrated review in Biochemistry, 2010, Lippincott William & Wilkins

3- Electronic Materials and Web Sites *etc*.

1- https://uh.edu/sibs/faculty/glegge/lectures.htm
2- https://biochem.oregonstate.edu/node/392

XXII. Course Policies:

53.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
54.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
55.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
56.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of **BIOCHEMISTRY II**

I. Course Identification and General Information:

1.	**Course Title:**	**BIOCHEMISTRY II**					
2.	**Course Code &Number:**	**FMS221**					
3.	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
4.	**Study level/ semester at which this course is offered:**	*(2nd) Year – (2nd) semester*					
5.	**Pre –requisite (if any):**	**FMS213 (biochemistry I)**					
6.	**Co –requisite (if any):**	**PHR225 (Phar. Organic chemistry II)**					
7.	**Program (s) in which the course is offered:**	**All Bachelor programs offered by the faculty of medical sciences**					
8.	**Language of teaching the course:**	**ENGLISH**					
9.	**Location of teaching the course:**	**At the university facility**					
10	**Prepared By:**						
11	**Date of Approval**						

II. Course Description:

This course is complementary to (biochemistry I). The course provide the students with knowledge of types, regulation, chemical structure, biosynthesis, metabolic pathways and physiological/pathological roles of biochemical compounds including enzymes, nucleic acids and hormones and also types, chemical properties, functions and fate in the body as well as pathological conditions resulted from disturbance of exogenous supplements including vitamins and minerals. The practical part provides the student skills of analysis of those compounds in vitro and bioassay them in biological specimens.

هذا المقرر هو الجزء الثاني المكمل لمقرر (الكيمياء الحيوية 1) ويزود الطلاب بمعرفة أنواع وتنظيم وتركيب الكيميائي والتخليق الحيوي والمسارات الأيضية والأدوار الفسيولوجية / المرضية للمركبات الكيميائية الحيوية بما في ذلك الإنزيمات والأحماض النووية والهرمونات وأيضًا الأنواع والخصائص الكيميائية والوظائف والمنتهى في الجسم وكذلك الحالات المرضية عن اضطراب ما يسمى بالمكملات الخارجية بما في ذلك الفيتامينات والمعادن. كما يوفر الجزء العملي لطالب مهارات تحليل تلك المركبات في المختبر واختبارها في العينات الحيوية

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Identify the roles of biochemical compounds, vitamins and minerals in human body.
		a2. Explicit the physiological/pathological involvement of enzymes, nucleic acids and hormones, vitamins and minerals.
A3	Explain physicochemical properties of materials and products	**a3**. Explain the physicochemical properties of carbohydrates, proteins and lipids..
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret body diseases resulted from disturbances in levels of enzymes, nucleic acids and hormones, vitamins and minerals.
		b2. Predict the outcomes of biochemical reactions involving enzymes, nucleic acids and hormones, vitamins and minerals.
		b3. Compare between metabolic reactions of enzymes, nucleic acids and hormones, vitamins and minerals.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b4.** Select standard operation procedure for isolation of enzymes, nucleic acids and hormones, vitamins and minerals from blood.
		b5. Choose a method for identification of enzymes, nucleic acids and hormones, vitamins and minerals.
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory.

C3	**C3.** Screen for drugs from different sources and carry out pharmacy relevant experiments successfully.	**c3 .**Bioassay enzymes, nucleic acids and hormones, vitamins and minerals in blood.
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c4 .**Search efficiently for information using documented and electronic sources of information.
		c5. Present and report his/her works correctly using appropriate writing rules and technologies media.
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the roles of biochemical compounds, vitamins and minerals in human body.	**Active Lecture, laboratory practice**	**written exams , Lab. term work, final practical exam**
a2. Explicit the physiological/pathological involvement of enzymes, nucleic acids and hormones, vitamins and minerals.		
a3. Explain the physicochemical properties of carbohydrates, proteins and lipids..		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret body diseases resulted from disturbances in levels of enzymes, nucleic acids and hormones, vitamins and minerals.	**Active lecture, feed-back learning**	**Written exam, quizzes**
b2. Predict the outcomes of biochemical reactions involving enzymes, nucleic acids and hormones, vitamins and minerals.		
b3. Compare between metabolic reactions of enzymes, nucleic acids and hormones, vitamins and minerals.		
b4. Select standard operation procedure for isolation of enzymes, nucleic acids and hormones, vitamins and minerals from blood.	**Active Lecture, , feed-back learning, Lab. practice**	**written exam , quizzes, Lab. term work, final practical exam**
b5. Choose a method for identification of enzymes, nucleic acids and hormones, vitamins and minerals.		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**Lab. Practice**	**Lab. term work, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory.		
c3 . Bioassay enzymes, nucleic acids and hormones, vitamins and minerals in blood.		
c4 . Search efficiently for information using documented and electronic sources of information.	**Group-project, feed-back learning**	**Assignment**
c5. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**Group-project , Lab. practice**	**Assignment s, Lab. term work, final practical exam**
d3. Participate efficiently with his colleagues in a team work.		

d2. Demonstrate the skills of time management and self-learning.	**Feed-back learning , Lab. practice**	**Assignment s, Lab. term work, final practical exam**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Nucleic acids**	a1, a2, a3, b1, b2, b3, b4,b5	• Basic structures • Types (DNA, RNA), roles, biosynthesis and catabolism • DNA replication and mutation • DNA repair mechanism	2	4
2	**Enzymes**	a1, a2, a3, b1, b2, b3, b4,b5	• Classifications and physiological roles • Nomenclature • Factors affecting enzyme action • Enzyme kinetics • Cytochrome P450 enzymes: classification, roles, stimulation and inhibition • Pathological conditions related to enzymes.	4	8
MID-TERM EXAM				1	2
3	**Hormones and related factors**	a1, a2, a3, b1, b2, b3, b4,b5	Classification, chemical structures, biosynthesis, catabolism and Pathological conditions related to: • Anterior Pituitary gland hormones • Posterior pituitary gland hormones • Corticosteroids • Thyroxin • Insulin • Sex hormones • Others	5	10
4	**Vitamins & minerals & trace elements**	a1, a2, a3, b1, b2, b3, b4,b5	• Vitamins: Classifications, physiological/pathological roles. Sources, chemical structures, absorption, distribution, metabolic	3	6

			pathways. elimination, daily requirements • Minerals and trace elements: physiological/pathological roles. Sources, salts, absorption, distribution, metabolic pathways. elimination, daily requirements		
Course Review		a1, a2, a3, b1, b2, b3, b4,b5	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	4 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	Isolation of DNA from saliva human sample	**1**	2	b4, b5, c1, c2, c3, d1, d2, d3
2.	Identification, isolation and bioassay of liver-related enzymes in blood	**2**	**4**	b4, b5, c1, c2, c3, d1, d2, d3
3.	Identification, isolation and bioassay of Myocardial infarction-related enzymes in blood	**1**	4	b4, b5, c1, c2, c3, d1, d2, d3
4.	bioassay of thyroid hormones	**1**	2	b4, b5, c1, c2, c3, d1, d2, d3
5.	bioassay of sex hormones : testosterone, estrogen in blood	**2**	4	b4, b5, c1, c2, c3, d1, d2, d3
6.	Identification, isolation and bioassay of minerals in urine	**1**	2	b4, b5, c1, c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b4, b5, c1, c2, c3, d1, d2, d3
Total		**9**	**18**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XX. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: the teacher provide the students with biochemical problems related to the studied topics. Every student is assigned to solve some of those problems individually.	d2, c4, c5	4-13	3
2	**Group:** each group of students will be assigned to present a search report on one pathological condition related to disturbances in biochemical levels in the body.	d1, d2, d3, c4, c5	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4, b5
		Assignments	7, 12	5	5	c3, c4, d1, d2, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2, a3, b1, b2, b3, b4, b5
3	Final exam (written exam)		16	50	50	a1, a2, a3, b1, b2, b3, b4, b5
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b4, b5, c1, c2,c3, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	b4, b5, c1, c2,c3, d1, d2, d3
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Kevin Ahern. Biochemistry free for all. 2018, Oregon State University

2- Essential References.

3. Pamela C. Champe, Lippincott's illustrated review in Biochemistry, 2010, Lippincott William & Wilkins

3- Electronic Materials and Web Sites *etc*.

1- https://uh.edu/sibs/faculty/glegge/lectures.htm
2- https://biochem.oregonstate.edu/node/392

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

HISTOLOGY

Course Code (**FMS224**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

III. Course Identification and General Information:

1	**Course Title:**	**HISTOLOGY**				
2	**Course Code &Number:**	**FMS224**				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2	-	1		3
4	**Study level/ semester at which this course is offered:**	Second year / 2ND semester				
5	**Pre –requisite:**	None				
6	**Co –requisite :**	FMS212 (Anatomy)				
7	**Program (s) in which the course is offered:**	All Bachelor programs in the faculty of medical sciences				
8	**Language of teaching the course:**	English				
9	**Location of teaching the course:**	At the university facility				
10	**Prepared by**					
11	**Date of Approval**					

IV. Course Description:

The course introduces students to the basic concepts of human histology, as well as to the histological implications of medicine. The theoretical part will cover epithelial, muscular, connective, and nervous tissues and tissues of different systems with emphasis on their structure and function. The practical part of this course will provide students with the skills to identify the components of different tissues, with a focus on the effect of the tissue structure on the performance of the specific functions of the tissue. The practical part will also enable the student to acquire the skill of distinguishing between healthy tissues and diseased tissues.

يعرف المقرر الدراسي الطلاب بالمفاهيم الأساسية لعلم الأنسجة البشرية، بالإضافة إلى تعريفهم بالمضامين النسيجية في الطب. سيغطي الجزء النظري الأنسجة الظهارية والعضلية الضامة والعصبية وأنسجة الأنظمة المختلفة مع التركيز على هيكلها ووظيفتها. ويهدف الجزء العملي من هذه المقرر إلى تزويد الطلاب بمهارات تحديد مكونات الأنسجة المختلفة مع التركيز على تأثير الشكل النسيجي على أداء الوظائف المحددة للنسيج ويمكن الجزء العملي أيضا للطالب اكتساب مهارة التمييز بين الأنسجة السليمة و الأنسجة المريضة

III. Intended learning outcomes of the course(CILOs) and their alignment to Program Intended learning outcomes (PILOs) and teaching and assessment strategies

1. Alignment to PILOs

PILOs		CILOS
Knowledge & understanding : Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body	**a1.** Show understanding of the basic concepts of human histology.
		a2. Describe the types of tissues in human body
Intellectual skills : Upon successful completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify human tissues according to structure and function
		b2. Differentiate between healthy and ill tissues
		b3. Relate tissue structure to its functions .
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely different biological samples and chemicals in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate successfully the light microscope and other instruments used in the laboratory.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues and teachers.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate time management and self-learning skills**.**
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Work successfully in team-work in the biology lab

2. Alignment to teaching and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Show understanding of the basic concepts of human histology.	**Active Lecture**	**written exams**
a2. Describe the types of tissues in human body		
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify human tissues according to structure and function	**Active Lecture**	**written exams**
b2. Differentiate between healthy and ill tissues	**Active Lecture, lab. practice**	**written exam, lab. term works, final practical exam**
b3. Relate tissue structure to its functions .	**Active Lecture , Feed-back learning**	**Written exams, assignment**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely different biological samples and chemicals in the laboratory	**Lab. Practice, Feed-back learning, group-project**	**lab. term works, final practical exam, assignment**
c2. Operate successfully the light microscope and other instruments used in the laboratory.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues and teachers.	**Lab. Practice, Group-project**	**lab. term works, final practical exam, assignment**
d3. Work successfully in team-work in the biology lab		
d2. Demonstrate time management and self-learning skills**.**	**Lab. Practice, feed-back learning**	**Lab. attitude, individual assignment**

IX. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	No. of Weeks	Contact hours	Learning Outcomes
1	Introduction to	▪ Definition			a1, a2, b1,

	histology	▪ History ▪ Applications and sub-types of histology ▪ Techniques of histology study ▪ Human tissue specimens preparation	2	4	b3
2	Epithelial tissue:	▪ Types and general biology ▪ Origin and function ▪ Healthy and ill tissue ▪ Diseases related to the tissue	2	4	a1, a2, b1, b3
3	Connective tissue	▪ Types and general biology ▪ Origin and function ▪ Healthy and ill tissue ▪ Diseases related to the tissue	2	4	a1, a2, b1, b3
4	Cartilage & bone	▪ Types and general biology ▪ Origin and function ▪ Healthy and ill tissue ▪ Diseases related to the tissue	2	4	a1, a2, b1, b3
			1	2	
4	Muscle tissue	- Types and general biology - Origin and function - Healthy and ill tissue - Diseases related to the tissue	2	4	a1, a2, b1, b3
5	Nervous tissue	▪ Structure of the organs of respiration ▪ Muscles of respiration: Intercostal and Diaphragm	2	4	a1, a2, b1, b3
6	Lymphatic vascular system	▪ General Features &Function, Types: Lymph nodes Thymus, Spleen & Tonsils	1	2	a1, a2, b1, b3
7	Embryology	• Embryology: definition, brief history • Fields of embryology • Human embryonic development	1	2	a1, a2, b1, b3
Final exam			1	2	
		Total	16	32	

B- Practical aspect

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Intended Learning Outcomes CILOs
61.	Introduction to Lab. safety, materials, tools and instruments	**1**	**2**	c1, c2, d1, d2

62.	Tissue specimen preparation (excision, incision, punch, shave, curetting's, core, whole-mount, squash, smear, section)	**1**	**2**	c1, c2, d1, d2
63.	Tissue specimen preparation (preservation, transport and storage)	**1**	**2**	c1, c2, d1, d2
64.	Tissue specimen preparation (fixation, grossing, processing, embedding, sectioning, staining)	**1**	**2**	c1, c2, d1, d2
65.	Epithelial tissues	**1**	**2**	c1, c2, d1, d2
66.	Connective tissues	**1**	**2**	c1, c2, d1, d2
67.	Muscle tissues	**1**	**2**	c1, c2, d1, d2
68.	Nervous tissue	**1**	**2**	c1, c2, d1, d2
PRACTICAL EXAM		**1**	**2**	c1, c2
Total		**8**	**18**	

X. Teaching strategies of the course:

4. Active Lecture
5. Feed-back learning
6. Laboratory practice

XI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Each student is assigned to draw anatomical features of an organ/system in the body	d1	4-10	5

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b3
		Assignments	7, 12	5	5	d1
2	Mid-semester exam (written exam)		7	10	10	a1, a2, b1, b3
3	Final exam (written exam)		16	50	50	a1, a2, b1, b3
TOTAL				70	70 %	

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b2, c1, c2, d1, d2, d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	b2, c1, c2, d2
Total				30	30 %	

XII. Learning Resources:
1- Required Textbook(s)
Leslie P. Gartner. Textbook of Histology. 2020, Elsevier Health Sciences
2- Essential References.
S. Bradbury**.** Hewer's Textbook of Histology for Medical Students**, 2014,** Elsevier Science
3- Electronic Materials and Web Sites *etc*.
https://histologylab.ctl.columbia.edu/HistologyLabManual.pdf

XIII. Course Policies:	
7.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
8.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
9.	**Exam Attendance/Punctuality:** Any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
10.	**Assignments &Projects:** Assignments and projects will be assessed individually unless the teacher request for group work
11.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
12.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of **Histology**

I. Course Identification and General Information:

1	**Course Title:**	**HISTOLOGY**				
2	**Course Code &Number:**	**FMS224**				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2	-	1		3
4	**Study level/ semester at which this course is offered:**	Second year / 2ND semester				
5	**Pre –requisite:**	None				
6	**Co –requisite :**	FMS212 (Anatomy)				
7	**Program (s) in which the course is offered:**	All Bachelor programs in the faculty of medical sciences				
8	**Language of teaching the course:**	English				
9	**Location of teaching the course:**	At the university facility				
10	**Prepared by**					
11	**Date of Approval**					

II. Course Description:

The course introduces students to the basic concepts of human histology, as well as to the histological implications of medicine. The theoretical part will cover epithelial, muscular, connective, and nervous tissues and tissues of different systems with emphasis on their structure and function. The practical part of this course will provide students with the skills to identify the components of different tissues, with a focus on the effect of the tissue structure on the performance of the specific functions of the tissue. The practical part will also enable the student to acquire the skill of distinguishing between healthy tissues and diseased tissues.

يعرف المقرر الدراسي الطلاب بالمفاهيم الأساسية لعلم الأنسجة البشرية، بالإضافة إلى تعريفهم بالمضامين النسيجية في الطب. سيغطي الجزء النظري الأنسجة الظهارية والعضلية الضامة والعصبية وأنسجة الأنظمة المختلفة مع التركيز على هيكلها ووظيفتها. ويهدف الجزء العملي من هذه المقرر إلى تزويد الطلاب بمهارات تحديد مكونات الأنسجة المختلفة مع التركيز على تأثير الشكل النسيجي على أداء الوظائف المحددة للنسيج ويمكن الجزء العملي أيضا للطالب من اكتساب مهارة التمييز بين الأنسجة السليمة و الأنسجة المريضة

III. Intended learning outcomes of the course(CILOs) and their alignment to Program Intended learning outcomes (PILOs) and teaching and assessment strategies

1. Alignment to PILOs

PILOs		CILOS
Knowledge & understanding : Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body	**a1.** Show understanding of the basic concepts of human histology.
		a2. Describe the types of tissues in human body
Intellectual skills : Upon successful completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify human tissues according to structure and function
		b2. Differentiate between healthy and ill tissues
		b3. Relate tissue structure to its functions .
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely different biological samples and chemicals in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate successfully the light microscope and other instruments used in the laboratory.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues and teachers.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate time management and self-learning skills**.**
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Work successfully in team-work in the biology lab

2. Alignment to teaching and assessment strategies		
(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Show understanding of the basic concepts of human histology.	**Active Lecture**	**written exams**
a2. Describe the types of tissues in human body		
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify human tissues according to structure and function	**Active Lecture**	**written exams**
b2. Differentiate between healthy and ill tissues	**Active Lecture, lab. practice**	**written exam, lab. term works, final practical exam**
b3. Relate tissue structure to its functions .	**Active Lecture , Feed-back learning**	**Written exams, assignment**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely different biological samples and chemicals in the laboratory	**Lab. Practice, Feed-back learning, group-project**	**lab. term works, final practical exam, assignment**
c2. Operate successfully the light microscope and other instruments used in the laboratory.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues and teachers.	**Lab. Practice , Group-project**	**lab. term works, final practical exam, assignment**
d3. Work successfully in team-work in the biology lab		
d2. Demonstrate time management and self-learning skills**.**	**Lab. Practice, feed-back learning**	**Lab. attitude, individual assignment**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	No. of Weeks	Contact hours	Learning Outcomes
1	Introduction to histology	▪ Definition ▪ History ▪ Applications and sub-types of histology ▪ Techniques of histology study ▪ Human tissue specimens preparation	2	4	a1, a2, b1, b3
2	Epithelial tissue:	▪ Types and general biology ▪ Origin and function ▪ Healthy and ill tissue ▪ Diseases related to the tissue	2	4	a1, a2, b1, b3
3	Connective tissue	▪ Types and general biology ▪ Origin and function ▪ Healthy and ill tissue ▪ Diseases related to the tissue	2	4	a1, a2, b1, b3
4	Cartilage & bone	▪ Types and general biology ▪ Origin and function ▪ Healthy and ill tissue ▪ Diseases related to the tissue	2	4	a1, a2, b1, b3
			1	2	
4	Muscle tissue	- Types and general biology - Origin and function - Healthy and ill tissue - Diseases related to the tissue	2	4	a1, a2, b1, b3
5	Nervous tissue	▪ Structure of the organs of respiration ▪ Muscles of respiration: Intercostal and Diaphragm	2	4	a1, a2, b1, b3
6	Lymphatic vascular system	▪ General Features &Function, Types: Lymph nodes Thymus, Spleen & Tonsils	1	2	a1, a2, b1, b3
7	Embryology	• Embryology: definition, brief history • Fields of embryology • Human embryonic development	1	2	a1, a2, b1, b3
Final exam			1	2	
		Total	16	32	

B- Practical aspect

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Intended Learning Outcomes CILOs
1.	Introduction to Lab. safety, materials, tools and instruments	**1**	**2**	c1, c2, d1, d2
2.	Tissue specimen preparation (excision, incision, punch, shave, curetting's, core, whole-mount, squash, smear, section)	**1**	**2**	c1, c2, d1, d2
3.	Tissue specimen preparation (preservation, transport and storage)	**1**	**2**	c1, c2, d1, d2
4.	Tissue specimen preparation (fixation, grossing, processing, embedding, sectioning, staining)	**1**	**2**	c1, c2, d1, d2
5.	Epithelial tissues	**1**	**2**	c1, c2, d1, d2
6.	Connective tissues	**1**	**2**	c1, c2, d1, d2
7.	Muscle tissues	**1**	**2**	c1, c2, d1, d2
8.	Nervous tissue	**1**	**2**	c1, c2, d1, d2
PRACTICAL EXAM		**1**	**2**	c1, c2
Total		**8**	**18**	

V. Teaching strategies of the course:

1. Active Lecture
2. Feed-back learning
3. Laboratory practice

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Each student is assigned to draw anatomical features of an organ/system in the body	d1	4-10	5

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b3
		Assignments	7, 12	5	5	d1
2	Mid-semester exam (written exam)		7	10	10	a1, a2, b1, b3
3	Final exam (written exam)		16	50	50	a1, a2, b1, b3
		TOTAL		70	70 %	

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b2, c1, c2, d1, d2, d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	b2, c1, c2, d2
		Total		30	30 %	

VIII. Learning Resources:

1- Required Textbook(s)

Leslie P. Gartner. Textbook of Histology. 2020, Elsevier Health Sciences

2- Essential References.

S. Bradbury**.** Hewer's Textbook of Histology for Medical Students**, 2014,** Elsevier Science

3- Electronic Materials and Web Sites *etc*.

https://histologylab.ctl.columbia.edu/HistologyLabManual.pdf

IX. Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** Any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments &Projects:** Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PATHOLOGY

Course Code (**FMS226**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XVII. Course Identification and General Information:

16	**Course Title:**	**PATHOLOGY**			
16	**Course Code &Number:**	**FMS226**			
16	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	**3**
16	**Study level/ semester at which this course is offered:**	*(2nd) Year –(2nd) semester*			
17	**Pre –requisite (if any):**				
17	**Co –requisite (if any):**	---------			
17	**Program (s) in which the course is offered:**	**All Bachelor programs of medical sciences offered by the university**			
17	**Language of teaching the course:**	**ENGLISH**			
17	**Location of teaching the course:**	**AT THE UNIVERSITY FALICITY**			
17	**Prepared by**				
17	**Date of Approval**				

L: Lecturing; P: practical ; Training

II. Course Description:

This course provide knowledge in general topics of" Pathology" which is a significant field in modern medical diagnosis and medical research, concerned mainly with the causal study of disease. The course also provides specific sections of pathology including: immunopathology, genetic pathology and tumor pathology. The course is preceded by (Physiology and clinical immunology) courses in order to make the students able to compare pathological changes of diseases with normal physiological status of body cells and tissues.

يقدم هذا المقرر الدراسي المعرفة في الموضوعات العامة "علم الأمراض" وهو مجال مهم في التشخيص الطبي الحديث والبحوث الطبية، والتي تهتم بشكل رئيسي بالدراسة السببية للمرض. يوفر المقرر أيضًا أقسامًا محددة من علم الأمراض بما في ذلك: علم أمراض المناعة، وعلم الأمراض الوراثي وعلم أمراض الأورام. يسبق المقرر الدراسي مقررات (علم وظائف الأعضاء والمناعة السريرية) بشكل أكبر لتمكين الطلاب من مقارنة التغيرات المرضية للأمراض مع الحالة الفسيولوجية الطبيعية لخلايا وأنسجة الجسم.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

7. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Identify the mechanisms by which diseases occur.
		a2. Determine the pathological changes in normal body systems that occur during diseases.
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret pathological features of diseases
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1 .**Search efficiently for information using documented and electronic sources of information.
		c2. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

8. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge& understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the mechanisms by which diseases occur.	**Active Lecture**	**Written exams**
a2. Determine the pathological changes in normal body systems that occur during diseases.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret pathological features of diseases	**Active Lecture-discussion** **Feed-back learning**	**Written exams, quizzes**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c2. Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**group-project**	**Assignments**
d3. Participate efficiently with his		

colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**feed-back learning**	**Assignments**

IV. Course Content:

Order	Units/Topics List	Sub Topics List	No. of Weeks	Contact hours	Course Learning Outcomes
1	**Introduction**	▪ Importance of the study of pathology ▪ Definition of terms ▪ Methods and techniques ▪ Cellular and Tissue changes : cell response to injury: injury repair, failure of repair, cell death; apoptosis	2	4	a1, a2, b1
	Inflammation and tissure repair	▪ Definition ▪ Acute inflammation ▪ Chronic inflammation ▪ Hemodynamic disorders ▪ Thermodynamic disorders ▪ Histopathological changes	3	6	a1, a2, b1
2	**Alteration in body fluids , electrolytes and acid-base**	Types, mechanisms, prognosis, disease	2	4	a1, a2, b1
Mid-term exam			1	2	
3	**Immunopathology**	Pathogenesis and types of • Immunodeficiency • immune-complex diseases • autoimmune diseases, • allergy/parasite immunity • T cells mediated-immunity diseases • Immunohematology • Immunogenetics, Tumor immunology	4	8	a1, a2, b1
4	**Genetic pathology**	• Diseases caused by single – gene defects • -Disorders with multifactor polygenic inheritance • Cytogenetic disorders • Down s syndrome • sex chromosome disorders • kline felters syndrome XYY	2	4	a1, a2, b1
5	**Tumor pathology**	etiology, carcinogenic agents, cellular ad histological changes, types of cancers	2	4	a1, a2, b1
Course Review			1	2	a1, a2, b1
Final exam			1		a1, a2, b1
Number of Weeks /and Units Per Semester			**16**	**32**	**7 units**

XVIII. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Field training: each 2-3 students are commissioned to do certain assignments in a real field entity such as drug factory, hospitals, pharmacies under supervision of both the field principle and an academic supervisor

XXI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to provide a search-based report on one pathological features such as inflammation, lesion, allergy, etc.	c1, c2, d2	6	
2	**Group** : each group of students will be assigned to provide a search-based report on a correlation of one disease to its pathological features.	c1, c2, d1, d2, d3	10	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b1
		Assignments	7, 12	10	10	c1, c2, d1, d2, d3
2	Mid-semester exam (written exam)		7	20	20	a1, a2, b1
3	Final exam of (written exam)		16	60	60	a1, a2, b1
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s)

1. James OD Oxford Textbook of Pathology, Oxford press, 2012.

2- Essential References.

1. John H. Bircky , Essentials of Anatomic and Clinical Pathology , 2nd ed. (2001). Health Professions Institute.

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/peddanasunilkumar/introduction-to-pathology-ppt
2. https://www.slideshare.net/danieleshetu99/1-introduction-to-pathology

IX. Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** Any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects:** Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of **PATHOLOGY**

I. Course Identification and General Information:

1.	Course Title:	PATHOLOGY			
2.	Course Code &Number:	FMS226			
3.	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	3
4.	Study level/ semester at which this course is offered:	*(2nd) Year –(2nd) semester*			
5.	Pre –requisite (if any):				
6.	Co –requisite (if any):	---------			
7.	Program (s) in which the course is offered:	All Bachelor programs of medical sciences offered by the university			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FALICITY			
10	Prepared by				
11	Date of Approval				

L: Lecturing; P: practical; Training

II. Course Description:

This course provide knowledge in general topics of" Pathology" which is a significant field in modern medical diagnosis and medical research, concerned mainly with the causal study of disease. The course also provides specific sections of pathology including: immunopathology, genetic pathology and tumor pathology. The course is preceded by (Physiology and clinical immunology) courses in order to make the students able to compare pathological changes of diseases with normal physiological status of body cells and tissues.

يقدم هذا المقرر الدراسي المعرفة في الموضوعات العامة في "علم الأمراض" وهو مجال مهم في التشخيص الطبي الحديث والبحوث الطبية، والتي تهتم بشكل رئيسي بالدراسة السببية للمرض. يوفر المقرر أيضًا أقسامًا محددة من علم الأمراض بما في ذلك: علم أمراض المناعة، وعلم الأمراض الوراثي وعلم أمراض الأورام. يسبق المقرر الدراسي مقررات (علم وظائف الأعضاء والمناعة السريرية) بشكل أكبر لتمكين الطلاب من مقارنة التغيرات المرضية للأمراض مع الحالة الفسيولوجية الطبيعية لخلايا وأنسجة الجسم.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Identify the mechanisms by which diseases occur.
		a2. Determine the pathological changes in normal body systems that occur during diseases.
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret pathological features of diseases
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1 .**Search efficiently for information using documented and electronic sources of information.
		c2. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge& understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the mechanisms by which diseases occur.	**Active Lecture**	**Written exams**
a2. Determine the pathological changes in normal body systems that occur during diseases.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret pathological features of diseases	**Active Lecture-discussion** **Feed-back learning**	**Written exams, quizzes**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c2. Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**group-project**	**Assignments**
d3. Participate efficiently with his colleagues in a team work.		

d2. Demonstrate the skills of time management and self-learning.	**feed-back learning**	**Assignments**

IV. Course Content:

Order	Units/Topics List	Sub Topics List	No. of Weeks	Contact hours	Course Learning Outcomes
1	**Introduction**	▪ Importance of the study of pathology ▪ Definition of terms ▪ Methods and techniques ▪ Cellular and Tissue changes : cell response to injury: injury repair, failure of repair, cell death; apoptosis	2	4	a1, a2, b1
	Inflammation and tissue repair	▪ Definition ▪ Acute inflammation ▪ Chronic inflammation ▪ Hemodynamic disorders ▪ Thermodynamic disorders ▪ Histopathological changes	3	6	a1, a2, b1
2	**Alteration in body fluids , electrolytes and acid-base**	Types, mechanisms, prognosis, disease	2	4	a1, a2, b1
Mid-term exam			1	2	
3	**Immunopathology**	Pathogenesis and types of • Immune-deficiencies • immune-complex diseases • autoimmune diseases, • allergy/parasite immunity • T cells mediated-immunity diseases • Immunohematology • Immunogenetics, Tumor immunology	4	8	a1, a2, b1
4	**Genetic pathology**	• Diseases caused by single – gene defects • -Disorders with multifactor polygenic inheritance • Cytogenetic disorders • Down's syndrome • sex chromosome disorders • kline felters syndrome XYY	2	4	a1, a2, b1
5	**Tumor pathology**	etiology, carcinogenic agents, cellular ad histological changes, types of cancers	2	4	a1, a2, b1
Course Review			1	2	a1, a2, b1
Final exam			1		a1, a2, b1
Number of Weeks /and Units Per Semester			**16**	**32**	**7 units**

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Field training: each 2-3 students are commissioned to do certain assignments in a real field entity such as drug factory, hospitals, pharmacies under supervision of both the field principle and an academic supervisor

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to provide a search-based report on one pathological features such as inflammation, lesion, allergy, etc.	c1, c2, d2	6	
2	**Group** : each group of students will be assigned to provide a search-based report on a correlation of one disease to its pathological features.	c1, c2, d1, d2, d3	10	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b1
		Assignments	7, 12	10	10	c1, c2, d1, d2, d3
2	Mid-semester exam (written exam)		7	20	20	a1, a2, b1
3	Final exam of (written exam)		16	60	60	a1, a2, b1
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s)

1. James OD Oxford Textbook of Pathology, Oxford press, 2012.

2- Essential References.

1. John H. Bircky , Essentials of Anatomic and Clinical Pathology , 2nd ed. (2001). Health Professions Institute.

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/peddanasunilkumar/introduction-to-pathology-ppt
2. https://www.slideshare.net/danieleshetu99/1-introduction-to-pathology

IX. Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** Any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects:** Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

Pharmaceutical Analytical Chemistry II

Course Code (**PHR222**)

XVIII. Course Identification and General Information:

17	Course Title:	Pharmaceutical Analytical Chemistry II					
17	Course Code &Number:	PHR222					
17	Credit hours:	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		1	1	-	1	-	3
18	Study level/ semester at which this course is offered:	*(2ND) Year – (2nd) semester*					
18	Pre –requisite (if any):	PHR214 (Phar. analytical Chemistry I)					
18	Co –requisite (if any):	none					
18	Program (s) in which the course is offered:	Pharmacy Bachelor					
18	Language of teaching the course:	ENGLISH					
18	Location of teaching the course:	IN THE UNIVERSITY					
18	Prepared by						
18	Date of Approval						

L: lecturing; Tut: Tutorial, S: seminar; P: practical; Tr.: training

XIX. Course Description:

The course is the second part of Pharmaceutical Analytical chemistry courses which provides the student with basic knowledge of principles, instrumentation and applications of basic analytical techniques analysis. This course concerns with study of basic thermal, optical methods and UV-visible and fluorescence spectrophotometry techniques. The practical part of the course provides the student the skills to safely handle chemicals, prepare analytical samples and perform those types of analysis using effectively the related instruments.

المقرر هو الجزء الثاني من مقررات الكيمياء التحليلية الصيدلانية التي تزود الطالب بالمعرفة الأساسية بالتقنيات المستخدمة لتحليل المواد و منها الأدوية و يهتم هذا المقرر بدراسة الطرق الحرارية والبصرية الأساسية وتقنيات القياس الطيفي الضوئي (المرئي والفوق البنفسجي و المضيء) و يوفر الجزء العملي من هذا المقرر للطالب المهارات اللازمة للتعامل مع المواد الكيميائية بأمان ، وإعداد العينات التحليلية وإجراء تلك الأنواع من التحليل باستخدام الأجهزة ذات الصلة بفعالية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

9. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon completion this course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1**. Explain the physicochemical properties of substances that can be utilized for their qualitative and quantitative analysis
A4	Describe analytical methods, principles, design and development techniques	**a2**. Describe the principles of thermal, optical methods and UV-visible and fluorescence spectrophotometry techniques
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist to perform accurate and precise quantitative and qualitative analysis.
Intellectual skills : Upon completion this course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret data obtained by thermal, optical methods and UV-visible and fluorescence spectrophotometry techniques
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b2.** Design a suitable optical and thermal analysis and UV-visible spectrophotometry method based on the substance physicochemical properties.
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b3.** Select appropriate standard operating procedure for optical and thermal, optical methods and UV-visible and fluorescence spectrophotometry techniques
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b4.** Calculate the content % of a material in a sample using UV-visible spectrophotometry method
Professional & practical skills : Upon completion this course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4. Present and report his/her works correctly using

		appropriate writing rules and technologies media.
Transferable skills : Upon completion this course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

1. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the physicochemical properties of substances that can be utilized for their qualitative and quantitative analysis	**Active Lecture**	**Written exam s**
a2. Describe the principles of thermal, optical methods and UV-visible and fluorescence spectrophotometry techniques		
a3. Describe the role of pharmacist to perform accurate and precise quantitative and qualitative analysis.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret data obtained by thermal, optical methods and UV-visible and fluorescence spectrophotometry techniques	**Active Lecture , laboratory practice, Feed-back learning**	**Written exams, quizzes, lab. term work, practical final exam**
b2. Design a suitable thermal, optical methods and UV-visible and fluorescence spectrophotometry techniques based on the substance physicochemical properties.		
b3. Select appropriate standard operating procedure for thermal, optical methods and UV-visible and fluorescence spectrophotometry techniques.		
b4. Calculate the content % of a material in a sample using UV-visible and spectrophotometry technique		

(c) Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to

Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c4. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Lab. practice, group-project, feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**

XVIII. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Thermal analysis**	a1,a2, a3, b1, b2, b3, b4	• **Thermogravimetry:** principle, instrumentation, temperature, verification, verification of electrobalance, procedures. • **Differential scanning calorimetry (DSC):** principles, instrumentation, calibration of equipments, procedures, phase change, applications, determination of purity • **Melting point testing: Principle**, instrumentation, procedures, applications • **Thermomicroscopy:** principle, apparatus, applications • **Freezing point tester:** Principle, purpose, apparatus • **Determination of Distillation Range:** Principle, purpose, apparatus, procedures, applications. • **Determination of boiling point** Principle, purpose, apparatus, procedures, applications.	4	8
2	**Optical analysis**	a1,a2, a3, b1, b2, b3, b4	• **Flow cyometry:** Principle, apparatus, procedures, applications • **Polarimetery: Determination of optical and specific optical rotation:** Principle, purpose, apparatus, procedures**,** • **Determination of refractive index:** Principle, purpose, apparatus, procedures	3	6

Mid-term exam				1	2
3	**Introduction to spectrophotometry**	a1,a2, a3, b1, b2, b3, b4	• Electromagnetic radiation, units, electromagnetic • Light spectra • Principle: Absorption and emission of radiation • Lambert's and Beer's Laws • Deviation from Lambert-Beer's law • Instrumentation • Colorometry, Chromophores and Auxochromes shifts	2	4
4	**Visible and UV Spectrophotometry**	a1,a2, a3, b1, b2, b3, b4	• Applications of Ultraviolet and Visible in quantitative analysis of drugs; data validation: calibration curve linearity, regression equation • Applications of Ultraviolet and Visible in qualitative analysis: Wavelength of maximal absorbance with illustrates examples • Factors Affecting Spectral Response • Data validation: specificity, robustness	3	6
5	**Fluorescence spectrophotometry (Fluorimetry)**	a1,a2, a3, b1, b2, b3, b4	• Principle, emission and Intensity: governing law • Instrumentation • Applications of quantitative analysis of drugs • Data validation: specificity, robustness	1	2
Course Review		a1, a2 , a3, b1, b2, b3, b4, b5, b6, d2	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	5 Units

B - Practical Aspect

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
69.	Determination of melting point by (capillary-thermometer-parrafin oil) method for : benzoic acid	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
70.	Determination of boiling point of toluene by (capillary- thermometer-paraffin oil)	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
71.	Polarimetric analysis of specific rotation of D- and L- compounds e.g. glucose	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
72.	Uv-visible spectrophometric operation and handling	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
73.	UV-visible spectrophometric analysis of potassium permanganate aqueous solution (prepare standard solution, determine UV spectrum and 300-700 nm. Wavelength max.)	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
74.	UV-visible spectrophometric analysis of potassium permanganate aqueous solution at wavelength max. (calibration curve and concentration of sample with unknown concentration)	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
75.	UV-visible spectrophometric analysis of aspirin in methanol solution (UV spectrum 200-400 nm, wavelength max.)	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
76.	UV-visible spectrophometric analysis of aspirin in methanol at wavelength max (calibration curve and concentration of sample with unknown concentration)	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
77.	Review	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
PRACTICAL EXAM		**10**	**20**	b1, b2, b3, b4, c1, c2, d1, d2, d3
Number of Weeks			**12**	

XIX. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XXII. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: the teacher provides the students with problems related to the studied topics. Every student is assigned to solve some of those problems individually.	c3, c4, d1, d2	4-13	3
2	**Group** : each group of students will be assigned to do a search report on pharmaceutical applications of one method of the studied titrimetric analysis.	c3, c4, d1, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4, b5, b6, b7
		Assignments	7, 12	5	5	c3, c4, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a3, b1, b2, b3, b4
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, b1, b2, b3, b4
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b1, b2, b3, b4, c1, c2, d1, d2,d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	b1, b2, b3, b4, c1, c2, d1, d2,d3
			Total	30	30 %	

XXI. Learning Resources:

1- Required Textbook(s) (maximum two).

David Harvey. Analytical Chemistry 2.1. 2016, DePauw University

2- Essential References.

Leslie G Chatten: Deans analytical chemistry handbook, 2013, McGraw Hill

3- Electronic Materials and Web Sites *etc*.

http://dpuadweb.depauw.edu/harvey_web/eTextProject/AC2.1Files/AnalChem2.1.pdf

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

Pharmaceutical Analytical Chemistry II

I. Course Identification and General Information:

1.	Course Title:	Pharmaceutical Analytical Chemistry II					
2.	Course Code &Number:	PHR222					
3.	Credit hours:	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		1	1	-	1	-	3
4.	Study level/ semester at which this course is offered:	(2ND) Year – (2nd) semester					
5.	Pre –requisite (if any):	PHR214 (Phar. analytical Chemistry I)					
6.	Co –requisite (if any):	none					
7.	Program (s) in which the course is offered:	Pharmacy Bachelor					
8.	Language of teaching the course:	ENGLISH					
9.	Location of teaching the course:	IN THE UNIVERSITY					
10	Prepared by						
11	Date of Approval						

II. Course Description:

The course is the second part of Pharmaceutical Analytical chemistry courses which provides the student with basic knowledge of principles, instrumentation and applications of basic analytical techniques analysis. This course concerns with study of basic thermal, optical methods and UV-visible and fluorescence spectrophotometry techniques. The practical part of the course provides the student the skills to safely handle chemicals, prepare analytical samples and perform those types of analysis using effectively the related instruments.

المقرر هو الجزء الثاني من مقررات الكيمياء التحليلية الصيدلانية التي تزود الطالب بالمعرفة الأساسية بالتقنيات المستخدمة لتحليل المواد و منها الأدوية و يهتم هذا المقرر بدراسة الطرق الحرارية والبصرية الأساسية وتقنيات القياس الطيفي الضوئي (المرئي والفوق البنفسجي و المضيء) و يوفر الجزء العملي من هذا المقرر للطالب المهارات اللازمة للتعامل مع المواد الكيميائية بأمان ، وإعداد العينات التحليلية وإجراء تلك الأنواع من التحليل باستخدام الأجهزة ذات الصلة بفعالية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon completion this course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1**. Explain the physicochemical properties of substances that can be utilized for their qualitative and quantitative analysis
A4	Describe analytical methods, principles, design and development techniques	**a2**. Describe the principles of thermal, optical methods and UV-visible and fluorescence spectrophotometry techniques
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist to perform accurate and precise quantitative and qualitative analysis.
Intellectual skills : Upon completion this course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret data obtained by thermal, optical methods and UV-visible and fluorescence spectrophotometry techniques
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b2.** Design a suitable optical and thermal analysis and UV-visible spectrophotometry method based on the substance physicochemical properties.
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b3.** Select appropriate standard operating procedure for optical and thermal, optical methods and UV-visible and fluorescence spectrophotometry techniques
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b4.** Calculate the content % of a material in a sample using UV-visible spectrophotometry method
Professional & practical skills : Upon completion this course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4. Present and report his/her works correctly using

		appropriate writing rules and technologies media.
Transferable skills : Upon completion this course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the physicochemical properties of substances that can be utilized for their qualitative and quantitative analysis	**Active Lecture**	**Written exam s**
a2. Describe the principles of thermal, optical methods and UV-visible and fluorescence spectrophotometry techniques		
a3. Describe the role of pharmacist to perform accurate and precise quantitative and qualitative analysis.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret data obtained by thermal, optical methods and UV-visible and fluorescence spectrophotometry techniques	**Active Lecture , laboratory practice, Feed-back learning**	**Written exams, quizzes, lab. term work, practical final exam**
b2. Design a suitable thermal, optical methods and UV-visible and fluorescence spectrophotometry techniques based on the substance physicochemical properties.		
b3. Select appropriate standard operating procedure for thermal, optical methods and UV-visible and fluorescence spectrophotometry techniques.		
b4. Calculate the content % of a material in a sample using UV-visible and spectrophotometry technique		

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c4. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Lab. practice, group-project, feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Thermal analysis**	a1,a2, a3, b1, b2, b3, b4	• **Thermogravimetry:** principle, instrumentation, temperature, verification, verification of electrobalance, procedures. • **Differential scanning calorimetry (DSC):** principles, instrumentation, calibration of equipments, procedures, phase change, applications, determination of purity • **Melting point testing: Principle**, instrumentation, procedures, applications • **Thermomicroscopy:** principle, apparatus, applications • **Freezing point tester:** Principle, purpose, apparatus • **Determination of Distillation Range:** Principle, purpose, apparatus, procedures, applications. • **Determination of boiling point** Principle, purpose, apparatus, procedures, applications.	4	8
2	**Optical analysis**	a1,a2, a3, b1, b2, b3, b4	• **Flow cyometry:** Principle, apparatus, procedures, applications • **Polarimetery: Determination of optical and specific optical rotation:** Principle, purpose, apparatus, procedures**,** • **Determination of refractive index:** Principle, purpose, apparatus, procedures	3	6

Mid-term exam				1	2
3	**Introduction to spectrophotometry**	a1,a2, a3, b1, b2, b3, b4	• Electromagnetic radiation, units, electromagnetic • Light spectra • Principle: Absorption and emission of radiation • Lambert's and Beer's Laws • Deviation from Lambert-Beer's law • Instrumentation • Colorometry, Chromophores and Auxochromes shifts	2	4
4	**Visible and UV Spectrophotometry**	a1,a2, a3, b1, b2, b3, b4	• Applications of Ultraviolet and Visible in quantitative analysis of drugs; data validation: calibration curve linearity, regression equation • Applications of Ultraviolet and Visible in qualitative analysis: Wavelength of maximal absorbance with illustrates examples • Factors Affecting Spectral Response • Data validation: specificity, robustness	3	6
5	**Fluorescence spectrophotometry (Fluorimetry)**	a1,a2, a3, b1, b2, b3, b4	• Principle, emission and Intensity: governing law • Instrumentation • Applications of quantitative analysis of drugs • Data validation: specificity, robustness	1	2
Course Review		a1, a2 , a3, b1, b2, b3, b4, b5, b6, d2	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	5 Units

B - Practical Aspect

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	Determination of melting point by (capillary-thermometer-parrafin oil) method for : benzoic acid	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
2.	Determination of boiling point of toluene by (capillary- thermometer-paraffin oil)	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
3.	Polarimetric analysis of specific rotation of D- and L- compounds e.g. glucose	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
4.	Uv-visible spectrophometric operation and handling	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
5.	UV-visible spectrophometric analysis of potassium permanganate aqueous solution (prepare standard solution, determine UV spectrum and 300-700 nm. Wavelength max.)	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
6.	UV-visible spectrophometric analysis of potassium permanganate aqueous solution at wavelength max. (calibration curve and concentration of sample with unknown concentration)	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
7.	UV-visible spectrophometric analysis of aspirin in methanol solution (UV spectrum 200-400 nm, wavelength max.)	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
8.	UV-visible spectrophometric analysis of aspirin in methanol at wavelength max (calibration curve and concentration of sample with unknown concentration)	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
9.	Review	**1**	**2**	b1, b2, b3, b4, c1, c2, d1, d2, d3
PRACTICAL EXAM		**10**	**20**	b1, b2, b3, b4, c1, c2, d1, d2, d3
Number of Weeks			**12**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XXIII. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: the teacher provides the students with problems related to the studied topics. Every student is assigned to solve some of those problems individually.	c3, c4, d1, d2	4-13	3
2	**Group** : each group of students will be assigned to do a search report on pharmaceutical applications of one method of the studied titrimetric analysis.	c3, c4, d1, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4, b5, b6, b7
		Assignments	7, 12	5	5	c3, c4, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a3, b1, b2, b3, b4
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, b1, b2, b3, b4
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b1, b2, b3, b4, c1, c2, d1, d2,d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	b1, b2, b3, b4, c1, c2, d1, d2,d3
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

David Harvey. Analytical Chemistry 2.1. 2016, DePauw University

2- Essential References.

Leslie G Chatten: Deans analytical chemistry handbook, 2013, McGraw Hill

3- Electronic Materials and Web Sites *etc*.

http://dpuadweb.depauw.edu/harvey_web/eTextProject/AC2.1Files/AnalChem2.1.pdf

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PHARMACEUTICAL ORGANIC CHEMISTRY II

Course Code (**PHR225**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

I. Course Identification and General Information:

188.	**Course Title:**	**Pharmaceutical Organic chemistry II**			
189.	**Course Code &Number:**	**PHR225**			
190.	**Credit hours:**	C.H			TOTAL
		L.	P.	T.	
		2	1	-	**3**
191.	**Study level/ semester at which this course is offered:**	*(2ND) Year – (2ND) semester*			
192.	**Pre –requisite (if any):**				
193.	**Co –requisite (if any):**	**FMS213 (Biochemistry I)**			
194.	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
195.	**Language of teaching the course:**	**ENGLISH**			
196.	**Location of teaching the course:**	**At the university facility**			
197.	**Prepared by**				
198.	**Date of Approval**				

L: lecturing; P: practical; T.: training

VII. Course Description:

The course is an introduction to specialized pharmacy courses (Medicinal chemistry), as it provides the student with basic knowledge of carbon chemistry from which all organic compounds, including drugs, are derived. The course focuses on uncomplicated organic compounds in terms of their functional chemical groups, chemical composition, physical and chemical properties and their interactions. And methods of preparation and common examples of them, and these compounds include: amines, nitro compounds, aldehydes, ketones, carboxylic acids, esters and amides. The practical part also provides the student with the skills necessary to deal with these compounds and perform tests to identify their reactions in the chemistry lab.

يعتبر المقرر مدخلا أساسيا لمقررات صيدلانية متخصصة هي (الكيمياء الدوائية) حيث يوفر للطالب المعرفة الأساسية لكيمياء الكربون التي منها يتم اشتقاق جميع المركبات العضوية بما فيها الأدوية و يركز المقرر على المركبات العضوية غير المعقدة من حيث مجموعاتها الكيميائية الوظيفية و تركيبها الكيميائي وخصائصها الفيزيائية والكيميائية و تفاعلاتها و طرق تحضيرها والأمثلة الشائعة لها , و تشمل تلك المركبات : الأمينات ومركبات النيترو والألدهيدات والكيتونات والأحماض الكربوكسيلية والإسترات والأميدات ا كما يوفر الجزء العملي للطالب المهارات اللازمة للتعامل مع هذه المركبات وإجراء اختبارات التعرف عليها و تفاعلاتها في معمل الكيمياء

IV. Intended learning outcomes of the course: (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

4. Alignment of CILOs to PILOs

PILOs		Intended learning outcomes of the course (CILOs)
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Explain the significance of organic chemistry in modern sciences.
A3	Explain physicochemical properties of materials and products	**a2.** Discuss the properties of models of structural formula, specific properties , mechanisms of reactions and synthesis of uncomplicated organic compounds.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Differentiate, name and draw the chemical structure of organic compounds.
		b2. Relate functional group in organic compounds to the physical and chemical properties of the compounds.
		b3. Predict the catalysts required and the outcomes of a reaction between an organic compound and other chemicals.
B3	Design an evaluate different types of safe and effective drugs, pharmaceutical dosage forms and cosmetic preparations	**b4.** Design a sequence to synthesize an organic compound from a parent compound.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation,	**c2.** Operate the instruments and perform experiments successfully in the laboratory

	formulation and analysis of materials according to standard guidelines.	
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3** .Search efficiently for information using documented and electronic sources of information.
		c4. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

3. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the significance of organic chemistry in modern sciences.	**Active Lecture**	**Written exams**
a2. Discuss the properties of models of structural formula, specific properties , mechanisms of reactions and synthesis of uncomplicated organic compounds.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies

b1. Differentiate, name and draw the chemical structure of organic compounds.	**Active Lecture ,laboratory practice, Feed-back learning**	**Written exams, quizzes, lab. term work, practical final exam**
b4. Design a sequence to synthesize an organic compound from a parent compound.		
b2. Relate functional group in organic compounds to the physical and chemical properties of the compounds.	**Lecture-discussion Feed-back learning**	**Written exams, quizzes**
b3. Predict the catalysts required and the outcomes of a reaction between an organic compound and other chemicals.		

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c4. Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Lab. practice, group-project, feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**

XIX. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	Aligned Course Learning Outcomes	Sub Topics List	No. of Weeks	contact hours
1	**Aliphatic and aromatic Amines**	a1, a2, b1, b2, b3, b4	• (definitions, types, general formula, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, synthesis and reactions)	3	6
2	**Aliphatic and aromatic Nitro compounds**	a1, a2, b1, b2, b3, b4	• **:** (definitions, types, general formula, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, physical properties, synthesis and reactions (including mechanisms of reactions).	2	4
3	**Aliphatic and aromatic aldehydes and ketones**	a1, a2, b1, b2, b3, b4	• **:** (definitions, types, general formula, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, physical properties, synthesis and reactions)	3	6
Mid-term exam				1	2
4	**Aliphatic and aromatic carboxylic acids**	a1, a2, b1, b2, b3, b4	(definitions, types, general formula, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, physical properties, synthesis and reactions (including mechanisms of reactions).	3	6

5	**Aliphatic and aromatic derivatives of carboxylic acids**	a1, a2, b1, b2, b3, b4	• **Esters, amides, acyl halides, acid anhydrides: :** (definitions, types, general formula, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, physical properties, synthesis and reactions (including mechanisms of reactions).	3	6
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	5 units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Learning Outcomes
78.	Physical properties & Chemical identification of compounds belonging to the following aliphatic and aromatic organic groups:			
79.	Amines	**2**	**4**	b1, b4, c1, c2, d1, d2, d3
80.	Aldehydes	**1**	**4**	b1, b4, c1, c2, d1, d2, d3
81.	Ketones	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
82.	Carboxylic acids	**2**	**4**	b1, b4, c1, c2, d1, d2, d3
83.	Esters	**2**	**4**	b1, b4, c1, c2, d1, d2, d3
84.	Scheme of identification of organic compounds	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b1, b4, c1, c2, d1, d2, d3
Total		**10**	**20**	

XX. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do certain assignments such as sud1arizing, internet search, make charts or solve mathematical problems related to the courses topics. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XXIV. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	
1	**Individual**: every student is assigned to solve problems at home. The problems are provided by the teacher at the end of each unit. Problems are related to completion of a chemical reaction, nomenclature, draw structures, mechanisms of reactions and others. The student should deliver his/her work every second week in a specific homework booklet. The teacher may ask the student, either personally, or at the class to make sure that the student work belongs to his/her lonely effort.	d1, d2, c3, c4	7	
2	**Group** : each group of students will be assigned to do a search-report about one type the mechanism of a reaction.	d1, d2, d3, c3, c4	12	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4
		Assignments	7, 12	5	5	d1, d2, d3, c3, c4
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, b1, b2, b3, b4
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, b1, b2, b3, b4
		TOTAL		70	70 %	70

Practical part assessment						
No.	**Assessment Method**		**Week Due**	**Mark**	**Proportion to Total course Assessment**	**Aligned Course Learning Outcomes(CILOs)**
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3, b1, b4
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	c1, c2, d2, b1, b4
			Total	30	30 %	

XXII. Learning Resources:

1- Required Textbook(s) (maximum two).

Xin Liu. Organic chemistry I, 2021, Kwantlen Polytechnic University, Canada

2- Essential References.

McMurry J.E. Fundamentals of Organic Chemistry. 2010, Cengage Learning

3- Electronic Materials and Web Sites *etc*.

https://kpu.pressbooks.pub/organicchemistry/open/download?type=pdf
http://www.cnm.manchester.ac.uk/people/jonathan/CH0001081100.pdf
https://gtu.ge/Agro-Lib/McMurry%20J.E.%20-%20Fundamentals%20of%20Organic%20Chemistry,%207th%20ed.%20-%202010.pdf
http://kgut.ac.ir/useruploads/1615027155168dde.pdf

X. Course Policies:	
5.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
6.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
7.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
8.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of **PHARMACEUTICAL ORGANIC CHEMISTRY II**

I. Course Identification and General Information:

1.	Course Title:	Pharmaceutical Organic chemistry II			
2.	Course Code &Number:	PHR225			
3.	Credit hours:	C.H			TOTAL
		L.	P.	T.	
		2	1	-	3
4.	Study level/ semester at which this course is offered:	*(2ND) Year – (2ND) semester*			
5.	Pre –requisite (if any):				
6.	Co –requisite (if any):	FMS213 (Biochemistry I)			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	At the university facility			
10.	Prepared by				
11.	Date of Approval				

II. Course Description:

The course is an introduction to specialized pharmacy courses (Medicinal chemistry), as it provides the student with basic knowledge of carbon chemistry from which all organic compounds, including drugs, are derived. The course focuses on uncomplicated organic compounds in terms of their functional chemical groups, chemical composition, physical and chemical properties and their interactions. And methods of preparation and common examples of them, and these compounds include: amines, nitro compounds, aldehydes, ketones, carboxylic acids, esters and amides. The practical part also provides the student with the skills necessary to deal with these compounds and perform tests to identify their reactions in the chemistry lab.

يعتبر المقرر مدخلا أساسيا لمقررات صيدلانية متخصصة هي (الكيمياء الدوائية) حيث يوفر للطالب المعرفة الأساسية لكيمياء الكربون التي منها يتم اشتقاق جميع المركبات العضوية بما فيها الأدوية و يركز المقرر على المركبات العضوية غير المعقدة من حيث مجموعاتها الكيميائية الوظيفية و تركيبها الكيميائي وخصائصها الفيزيائية والكيميائية و تفاعلاتها و طرق تحضيرها والأمثلة الشائعة لها , و تشمل تلك المركبات : الأمينات ومركبات النيترو والألدهيدات والكيتونات والأحماض الكربوكسيلية والإسترات والأميدات ا كما يوفر الجزء العملي للطالب المهارات اللازمة للتعامل مع هذه المركبات وإجراء اختبارات التعرف عليها و تفاعلاتها في معمل الكيمياء

III. Intended learning outcomes of the course: (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment of CILOs to PILOs

PILOs		Intended learning outcomes of the course (CILOs)
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Explain the significance of organic chemistry in modern sciences.
A3	Explain physicochemical properties of materials and products	**a2.** Discuss the properties of models of structural formula, specific properties , mechanisms of reactions and synthesis of uncomplicated organic compounds.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Differentiate, name and draw the chemical structure of organic compounds.
		b2. Relate functional group in organic compounds to the physical and chemical properties of the compounds.
		b3. Predict the catalysts required and the outcomes of a reaction between an organic compound and other chemicals.
B3	Design an evaluate different types of safe and effective drugs, pharmaceutical dosage forms and cosmetic preparations	**b4.** Design a sequence to synthesize an organic compound from a parent compound.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory

C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

4. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the significance of organic chemistry in modern sciences.	**Active Lecture**	**Written exams**
a2. Discuss the properties of models of structural formula, specific properties , mechanisms of reactions and synthesis of uncomplicated organic compounds.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Differentiate, name and draw the chemical structure of organic compounds.	**Active Lecture ,laboratory practice, Feed-back learning**	**Written exams, quizzes, lab. term work, practical final exam**
b4. Design a sequence to synthesize an organic compound from a parent compound.		
b2. Relate functional group in organic compounds to the physical and chemical properties of the compounds.	**Lecture-discussion Feed-back learning**	**Written exams, quizzes**
b3. Predict the catalysts required and the outcomes of a reaction between an organic compound and other chemicals.		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c4. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**
d3. Participate efficiently with his colleagues in a team work.		

d2. Demonstrate the skills of time management and self-learning.	**Lab. practice, group-project, feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	Aligned Course Learning Outcomes	Sub Topics List	No. of Weeks	contact hours
1	**Aliphatic and aromatic Amines**	a1, a2, b1, b2, b3, b4	• (definitions, types, general formula, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, synthesis and reactions)	3	6
2	**Aliphatic and aromatic Nitro compounds**	a1, a2, b1, b2, b3, b4	• **:** (definitions, types, general formula, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, physical properties, synthesis and reactions (including mechanisms of reactions).	2	4
3	**Aliphatic and aromatic aldehydes and ketones**	a1, a2, b1, b2, b3, b4	• **:** (definitions, types, general formula, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, physical properties, synthesis and reactions)	3	6
Mid-term exam				1	2
4	**Aliphatic and aromatic carboxylic acids**	a1, a2, b1, b2, b3, b4	(definitions, types, general formula, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, physical properties, synthesis and reactions (including mechanisms of reactions).	3	6

5	**Aliphatic and aromatic derivatives of carboxylic acids**	a1, a2, b1, b2, b3, b4	• **Esters, amides, acyl halides, acid anhydrides: :** (definitions, types, general formula, nomenclature, influence of functional group on physical and chemical properties, radical groups nomenclature, physical properties, synthesis and reactions (including mechanisms of reactions).	3	6
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	5 units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Learning Outcomes
1.	Physical properties & Chemical identification of compounds belonging to the following aliphatic and aromatic organic groups:			
2.	Amines	**2**	**4**	b1, b4, c1, c2, d1, d2, d3
3.	Aldehydes	**1**	**4**	b1, b4, c1, c2, d1, d2, d3
4.	Ketones	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
5.	Carboxylic acids	**2**	**4**	b1, b4, c1, c2, d1, d2, d3
6.	Esters	**2**	**4**	b1, b4, c1, c2, d1, d2, d3
7.	Scheme of identification of organic compounds	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b1, b4, c1, c2, d1, d2, d3
Total		**10**	**20**	

XXI. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do certain assignments such as sud1arizing, internet search, make charts or solve mathematical problems related to the courses topics. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	
1	**Individual**: every student is assigned to solve problems at home. The problems are provided by the teacher at the end of each unit. Problems are related to completion of a chemical reaction, nomenclature, draw structures, mechanisms of reactions and others. The student should deliver his/her work every second week in a specific homework booklet. The teacher may ask the student, either personally, or at the class to make sure that the student work belongs to his/her lonely effort.	d1, d2, c3, c4	7	
2	**Group** : each group of students will be assigned to do a search-report about one type the mechanism of a reaction.	d1, d2, d3, c3, c4	12	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4
		Assignments	7, 12	5	5	d1, d2, d3, c3, c4
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, b1, b2, b3, b4
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, b1, b2, b3, b4
		TOTAL		70	70 %	70

Practical part assessment						
No.	**Assessment Method**		**Week Due**	**Mark**	**Proportion to Total course Assessment**	**Aligned Course Learning Outcomes(CILOs)**
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3, b1, b4
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	c1, c2, d2, b1, b4
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Xin Liu. Organic chemistry I, 2021, Kwantlen Polytechnic University, Canada

2- Essential References.

McMurry J.E. Fundamentals of Organic Chemistry. 2010, Cengage Learning

3- Electronic Materials and Web Sites *etc*.

https://kpu.pressbooks.pub/organicchemistry/open/download?type=pdf
http://www.cnm.manchester.ac.uk/people/jonathan/CH0001081100.pdf
https://gtu.ge/Agro-Lib/McMurry%20J.E.%20-%20Fundamentals%20of%20Organic%20Chemistry,%207th%20ed.%20-%202010.pdf
http://kgut.ac.ir/useruploads/1615027155168dde.pdf

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PHARMACEUTICS I

Course Code (**PHR227**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

Prepared by:	Reviewed by:	Head of the Department:	Dean:
Dr. -	Dr.	Dr.	

XX. Course Identification and General Information:

19	**Course Title:**	**PHARMACEUTICS I**					
20	**Course Code &Number:**	**PHR227**					
20	**Credit hours:**	C.H					TOTAL
		L.			P.	Tr.	
		2	-	-	1	-	**3**
20	**Study level/ semester at which this course is offered:**	*(2nd) Year – (second) semester*					
20	**Pre –requisite (if any):**	-					
20	**Co –requisite (if any):**	-					
20	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**					
20	**Language of teaching the course:**	**ENGLISH**					
20	**Location of teaching the course:**	**At the university facility**					
20	**Prepared by**						
20	**Date of Approval**						

XXI. Course Description:

The first part of this course provides the student with an introduction to the science and art of designing pharmaceutical dosage forms, especially the roles and types of excipients in the dosage form and the stages of developing the dosage form, which includes the pre-formulation stage, the formulation and development stage, and then the production stage. The second part of the course provides knowledge for preparing liquid dosage forms. The practical part of this course provides the student with the skills necessary to prepare these dosage forms. The practical part provides the student with skill of compounding the pharmaceutical liquid dosage forms in Pharmaceutics Lab.

يزود الجزء الأول في هذا المقرر الطالب بمقدمة عن علم وفن تصميم الأشكال الدوائية خصوصا أدوار وأنواع المواد الغير فعالة في الشكل الدوائي ومراحل تطوير الشكل الدوائي والتي تشمل مرحلة ما قبل الصياغة ثم مرحلة الصياغة والتطوير ثم مرحلة الانتاج ، كما يوفر الجزء الثاني من المقرر المعرفة والمهارات الأساسية لإعداد الأشكال الدوائية السائلة ويزود الجزء العملي من هذا المقرر الطالب بالمهارات اللازمة لتحضير تلك الأشكال ويزود الجانب العملي من المقرر الطالب بمهاراه تحضير الأشكال الدوائية السائلة يدويا في معمل الصيدلانيات

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

10. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A4	Describe analytical methods, principles, design and development techniques	**a1.** Describe the significance of pharmaceutics as art and science of dosage form design
		a2. Explicit the types and roles of excipients included in different types of pharmaceutical liquid dosage forms.
		a3. Describe the stages of designing a pharmaceutical dosage form
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the role of pharmacist in formulation of pharmaceutical dosage forms
A11	Identify the properties of dosage forms and novel drug delivery systems.	**a5.** Explicit the general properties, advantages and disadvantages of pharmaceutical liquid dosage forms.
		a6. Discuss the principles, pharmacopeial requirements, methods of preparation, of various types pharmaceutical liquid dosage forms.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1 .** Classify pharmaceutical dosage forms and categorize liquid dosage forms.
		b2. Compare between various types of pharmaceutical liquid dosage forms in particular between old and current dosage forms and between solutions and dispersion liquids.
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b3.** Design liquid pharmaceutical dosage forms

Professional & practical skills: Upon successful completion of the course, students will be able to:

C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C5	Employ the relevant ways to produce extemporaneous preparations including TPN and IV admixtures.	**c3.** Employ the relevant way to prepare liquid extemporaneous pharmaceutical dosage forms.
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c4 .**Search efficiently for information using documented and electronic sources of information.
		c5 Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with colleagues in a team work.

11. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge& understanding to

Teaching Strategies and Assessment Strategies		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Describe the significance of pharmaceutics as art and science of dosage form design	**Active Lecture**	**Written exams**
a2. Explicit the types and roles of excipients included in different types of pharmaceutical liquid dosage forms.		
a3. Describe the stages of designing a pharmaceutical dosage form		
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 . Classify pharmaceutical dosage forms and categorize liquid dosage forms.	**Active Lecture , Feed-back learning**	**Written exams, quizzes**
b2. Compare between various types of pharmaceutical liquid dosage forms in particular between old and current dosage forms and between solutions and dispersion liquids.		
b3. Design liquid pharmaceutical dosage forms		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3. Employ the relevant way to prepare liquid extemporaneous pharmaceutical dosage forms.		
c4 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c5 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching		

Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**
d3. Participate efficiently with colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Lab. practice, group-project, feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**

XX. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to pharmaceutics**	a1, a2, a4, b1, b2	Definitions and brief history of pharmaceutics, pharmacopeia, Definition of dosage form, the components, the need to dosage forms, classification of dosage forms	1	2
2	**Pharmaceutical excipients & packaging**	a1, a2, a4	Roles, types with examples • **Essential:** solvents, vehicles, emulsifying agents, binders, etc. • **Stabilizers:** buffers, preservatives, antioxidants, viscosity enhancers, anti-cake, etc. • **Bioavailability enhancers:** solubilizer • **Organoleptic** excipients: colorants, sweeteners, flavors • **Excipients for other purposes** e.g. isotonic agents • Type and function of packaging materials	2	4
3	**Design of dosage form: Preformulation, Formulation and development**	a1, a2, a3, a4, b3	• **Preformulation stage:** physicochemical properties and analytical data required. Scheme of preformulation, Compatibility testing. • **Formulation:** general rules, sources of raw materials, economic impact • **Development** stage • **Production** stage	3	6
4	**Introduction to Non-sterile Pharmaceutical solutions**	a1, a2, a3, a4, a5, a6, b1, b2, b3	Definition of solutions, advantages, disadvantages, , classification of pharmaceutical solutions, general method of preparation, enhancement of dissolution, types of solvents : water, cosolvents, non-aqueous solvents	1	2
5	**Aqueous Pharmaceutical solutions (1)**		Definition, General characters, advantages, disadvantages, method of preparation, formulations and excipients with examples of :	1	2

			Topical : (aqueous Tinctures, Douches/washes, Enema, mouthwashes/gargle, nasal solutions, otic aqueous solutions)		
Mid-term exam				1	2
6	**Aqueous Pharmaceutical solutions (2)**	a1, a2, a3, a4, a5, a6, b1, b2, b3	Definition, General characters, advantages, disadvantages, method of preparation, formulations and excipients with examples of : **Oral :** Syrups, linctuses, Elixirs, other oral solutions.	1	2
7	**Non-Aqueous Pharmaceutical solutions and Specific types of solutions**	a1, a2, a3, a4, a5, a6, b1, b2, b3	**Non-aqueous solutions** Definition, General characters, advantages, disadvantages, method of preparation, formulations and excipients with examples of : **Topical :**Alcoholic Tinctures, Collodions, liniments, Glycerites **Oral:** oleovitamins **Specific types of solutions** • Intermediate solutions: aromatic water, spirits, Mucilages, etc. • Sterile pharmaceutical solutions: sterility, sterilization, Isotonicity calculations	1	2
8	**Non-sterile liquid Dispersion systems (1)**	a1, a2, a3, a4, a5, a6, b1, b2, b3	• **Introduction** Definition, types: coarse dispersion, fine dispersion; compare disperse system and true solution ; compare colloids, suspensions, emulsions; general advantages and problems of disperse systems • **Coarse dispersions** ➢ **Suspensions** o Definition, types, advantages , disadvantages, ideal properties o Formulation: (flocculated, deflocculated) , excipients (suspending agents, flocculating agents; others) o Steps of preparation o Instability Problems : sedimentation; cake formation; evaluation and approaches to	2	4

			reduce o Packaging		
8	**Non-sterile liquid Dispersion systems (2)**		➢ **Emulsions** o Definition, types, advantages, disadvantages o Formulation: excipients (Emulsifying agents; types and selection; HLB) o Methods of preparation: wet method, dry o method, bottle method o Self-emulsified emulsions o Instability problems: coalescence, braking, creaming, phase inversion; causes and how to reduce • **Fine dispersions** Definition, types, advantages, disadvantages, principles and method of preparations ➢ **Colloidal suspensions** • **Microemulsions and nanoemulsion**	2	4
FINAL - EXAM				1	2
TOTAL				16	32

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
Aqueous solutions				
1.	Iodine tincture	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
2.	vaginal douches (sodium borate solution)	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
3.	simple syrup (BP; USP)	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
4.	Peppermint aromatic water	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
5.	Oral rehydration solution	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
6.	Preparation of elixir (paracetamol elixir)	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
Non-aqueous solutions				
7.	camphor liniment	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
8.	Otic Glycerites	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
Liquid disperse systems				
9.	Calamine lotion (suspension)	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
10.	emulsions (castor oil emulsion)	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b3, c1,c2, c3, d1, d2, d3
Total		**11**	**22 equivalent to 11 credit hours**	

XXII. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XXV. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to present a search report supported with images on 5 trade names (commercial preparations) of the studied dosage forms	c4, c5, d2	4-13	3
2	**Group** :every group is assigned to present an illustrating videos on lab. And industrial preparation of 3 types of studies dosage forms.	c4, c5, d1, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3
		Assignments	7, 12	5	5	c4, c5, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a3, b1
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, a4, a5, a6, b1, b2, b3
			TOTAL	70	70 %	70

Practical part assessment						
No.	**Assessment Method**		**Week Due**	**Mark**	**Proportion to Total course Assessment**	**Aligned Course Learning Outcomes(CILOs)**
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, c3, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	c1, c2, c3, d1, d2, d3
			Total	30	30 %	

XXIII. Learning Resources

1- Required Textbook(s) (maximum two).

1. Aulton M.E., Pharmaceutics: the science of dosage form design, 2013, Churchill Livingstone, UK
2. Linda Felton. Remington Essentials of Pharmaceutics, 2012, Pharmaceutical press, UK

2- Essential References.

1. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA
2. United states pharmacopeia (USP-41, NF 36), 2018, the United States Pharmacopeial Convention.

3- Electronic Materials and Web Sites *etc*.

https://www.slideshare.net/PranatiChavan/introduction-to-dosage-form-251052087
https://www.slideshare.net/PranatiChavan/liquid-dosage-forms-ppt

XI. Course Policies:	
9.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
10.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
11.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
12.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the faculty rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of **PHARMACEUTICS I**

I. Course Identification and General Information:

1.	**Course Title:**	**PHARMACEUTICS I**					
2.	**Course Code &Number:**	**PHR227**					
3.	**Credit hours:**	C.H					TOTAL
		L.			P.	Tr.	
		2	-	-	1	-	**3**
4.	**Study level/ semester at which this course is offered:**	*(2nd) Year – (second) semester*					
5.	**Pre –requisite (if any):**	-					
6.	**Co –requisite (if any):**	-					
7.	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**					
8.	**Language of teaching the course:**	**ENGLISH**					
9.	**Location of teaching the course:**	**At the university facility**					
10	**Prepared by**						
11	**Date of Approval**						

II. Course Description:

The first part of this course provides the student with an introduction to the science and art of designing pharmaceutical dosage forms, especially the roles and types of excipients in the dosage form and the stages of developing the dosage form, which includes the pre-formulation stage, the formulation and development stage, and then the production stage. The second part of the course provides knowledge for preparing liquid dosage forms. The practical part of this course provides the student with the skills necessary to prepare these dosage forms. The practical part provides the student with skill of compounding the pharmaceutical liquid dosage forms in Pharmaceutics Lab.

يزود الجزء الأول في هذا المقرر الطالب بمقدمة عن علم وفن تصميم الأشكال الدوائية خصوصا أدوار وأنواع المواد الغير فعالة في الشكل الدوائي ومراحل تطوير الشكل الدوائي والتي تشمل مرحلة ما قبل الصياغة ثم مرحلة الصياغة والتطوير ثم مرحلة الانتاج ، كما يوفر الجزء الثاني من المقرر المعرفة والمهارات الأساسية لإعداد الأشكال الدوائية السائلة ويزود الجزء العملي من هذا المقرر الطالب بالمهارات اللازمة لتحضير تلك الأشكال ويزود الجانب العملي من المقرر الطالب بمهاراه تحضير الأشكال الدوائية السائلة يدويا في معمل الصيدلانيات

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A4	Describe analytical methods, principles, design and development techniques	**a1.** Describe the significance of pharmaceutics as art and science of dosage form design
		a2. Explicit the types and roles of excipients included in different types of pharmaceutical liquid dosage forms.
		a3. Describe the stages of designing a pharmaceutical dosage form
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the role of pharmacist in formulation of pharmaceutical dosage forms
A11	Identify the properties of dosage forms and novel drug delivery systems.	**a5.** Explicit the general properties, advantages and disadvantages of pharmaceutical liquid dosage forms.
		a6. Discuss the principles, pharmacopeial requirements, methods of preparation, of various types pharmaceutical liquid dosage forms.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1 .** Classify pharmaceutical dosage forms and categorize liquid dosage forms.
		b2. Compare between various types of pharmaceutical liquid dosage forms in particular between old and current dosage forms and between solutions and dispersion liquids.
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b3.** Design liquid pharmaceutical dosage forms
Professional & practical skills: Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory

C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C5	Employ the relevant ways to produce extemporaneous preparations including TPN and IV admixtures.	**c3.** Employ the relevant way to prepare liquid extemporaneous pharmaceutical dosage forms.
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c4 .**Search efficiently for information using documented and electronic sources of information.
		c5 Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge& understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Describe the significance of pharmaceutics as art and science of dosage form design	**Active Lecture**	**Written exams**
a2. Explicit the types and roles of excipients included in different types of pharmaceutical liquid dosage forms.		
a3. Describe the stages of designing a pharmaceutical dosage form		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching

Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 . Classify pharmaceutical dosage forms and categorize liquid dosage forms.	**Active Lecture , Feed-back learning**	**Written exams, quizzes**
b2. Compare between various types of pharmaceutical liquid dosage forms in particular between old and current dosage forms and between solutions and dispersion liquids.		
b3. Design liquid pharmaceutical dosage forms		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3. Employ the relevant way to prepare liquid extemporaneous pharmaceutical dosage forms.		
c4 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c5 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**
d3. Participate efficiently with colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Lab. practice, group-project, feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to pharmaceutics**	a1, a2, a4, b1, b2	Definitions and brief history of pharmaceutics, pharmacopeia, Definition of dosage form, the components, the need to dosage forms, classification of dosage forms	1	2
2	**Pharmaceutical excipients & packaging**	a1, a2, a4	Roles, types with examples • **Essential:** solvents, vehicles, emulsifying agents, binders, etc. • **Stabilizers:** buffers, preservatives, antioxidants, viscosity enhancers, anti-cake, etc. • **Bioavailability enhancers:** solubilizer • **Organoleptic** excipients: colorants, sweeteners, flavors • **Excipients for other purposes** e.g. isotonic agents • Type and function of packaging materials	2	4
3	**Design of dosage form: Preformulation, Formulation and development**	a1, a2, a3, a4, b3	• **Preformulation stage:** physicochemical properties and analytical data required. Scheme of preformulation, Compatibility testing. • **Formulation:** general rules, sources of raw materials, economic impact • **Development** stage • **Production** stage	3	6
4	**Introduction to Non-sterile Pharmaceutical solutions**	a1, a2, a3, a4, a5, a6, b1, b2, b3	Definition of solutions, advantages, disadvantages, , classification of pharmaceutical solutions, general method of preparation, enhancement of dissolution, types of solvents : water, cosolvents, non-aqueous solvents	1	2
5	**Aqueous Pharmaceutical**		Definition, General characters, advantages, disadvantages, method of preparation,	1	2

	solutions (1)		formulations and excipients with examples of : **Topical** : (aqueous Tinctures, Douches/washes, Enema, mouthwashes/gargle, nasal solutions, otic aqueous solutions)		
Mid-term exam				1	2
6	**Aqueous Pharmaceutical solutions (2)**	a1, a2, a3, a4, a5, a6, b1, b2, b3	Definition, General characters, advantages, disadvantages, method of preparation, formulations and excipients with examples of : **Oral :** Syrups, linctuses, Elixirs, other oral solutions.	1	2
7	**Non-Aqueous Pharmaceutical solutions and Specific types of solutions**	a1, a2, a3, a4, a5, a6, b1, b2, b3	**Non-aqueous solutions** Definition, General characters, advantages, disadvantages, method of preparation, formulations and excipients with examples of : **Topical :**Alcoholic Tinctures, Collodions, liniments, Glycerites **Oral:** oleovitamins **Specific types of solutions** • Intermediate solutions: aromatic water, spirits, Mucilages, etc. • Sterile pharmaceutical solutions: sterility, sterilization, Isotonicity calculations	1	2
8	**Non-sterile liquid Dispersion systems (1)**	a1, a2, a3, a4, a5, a6, b1, b2, b3	• **Introduction** Definition, types: coarse dispersion, fine dispersion; compare disperse system and true solution ; compare colloids, suspensions, emulsions; general advantages and problems of disperse systems • **Coarse dispersions** ➢ **Suspensions** ○ Definition, types, advantages , disadvantages, ideal properties ○ Formulation: (flocculated, deflocculated) , excipients (suspending agents, flocculating agents; others) ○ Steps of preparation ○ Instability Problems : sedimentation; cake	2	4

			formation; evaluation and approaches to reduce o Packaging		
8	**Non-sterile liquid Dispersion systems (2)**		➢ **Emulsions** o Definition, types, advantages, disadvantages o Formulation: excipients (Emulsifying agents; types and selection; HLB) o Methods of preparation: wet method, dry o method, bottle method o Self-emulsified emulsions o Instability problems: coalescence, braking, creaming, phase inversion; causes and how to reduce • **Fine dispersions** Definition, types, advantages, disadvantages, principles and method of preparations ➢ **Colloidal suspensions** • **Microemulsions and nanoemulsion**	2	4
FINAL - EXAM				1	2
TOTAL				16	32

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
Aqueous solutions				
1.	Iodine tincture	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
2.	vaginal douches (sodium borate solution)	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
3.	simple syrup (BP; USP)	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
4.	Peppermint aromatic water	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
5.	Oral rehydration solution	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
6.	Preparation of elixir (paracetamol elixir)	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
Non-aqueous solutions				
7.	camphor liniment	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
8.	Otic Glycerites	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
Liquid disperse systems				
9.	Calamine lotion (suspension)	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
10.	emulsions (castor oil emulsion)	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b3, c1,c2, c3, d1, d2, d3
Total		**11**	**22 equivalent to 11 credit hours**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XXVI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to present a search report supported with images on 5 trade names (commercial preparations) of the studied dosage forms	c4, c5, d2	4-13	3
2	**Group** :every group is assigned to present an illustrating videos on lab. And industrial preparation of 3 types of studies dosage forms.	c4, c5, d1, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3
		Assignments	7, 12	5	5	c4, c5, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a3, b1
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, a4, a5, a6, b1, b2, b3
			TOTAL	70	70 %	70

Practical part assessment						
No.	**Assessment Method**		**Week Due**	**Mark**	**Proportion to Total course Assessment**	**Aligned Course Learning Outcomes(CILOs)**
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, c3, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	c1, c2, c3, d1, d2, d3
			Total	30	30 %	

VIII. Learning Resources

1- Required Textbook(s) (maximum two).

1. Aulton M.E., Pharmaceutics: the science of dosage form design, 2013, Churchill Livingstone, UK
2. Linda Felton. Remington Essentials of Pharmaceutics, 2012, Pharmaceutical press, UK

2- Essential References.

1. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA
2. United states pharmacopeia (USP-41, NF 36), 2018, the United States Pharmacopeial Convention.

3- Electronic Materials and Web Sites *etc*.

https://www.slideshare.net/PranatiChavan/introduction-to-dosage-form-251052087
https://www.slideshare.net/PranatiChavan/liquid-dosage-forms-ppt

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the faculty rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PHYSIOLOGY II

Course Code (**FMS223**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XXII. Course Identification and General Information:

21	**Course Title:**	**PHYSIOLOGY II**					
21	**Course Code:**	**FMS223**					
21	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
21	**Study level/ semester at which this course is offered:**	*(2ND) Year – (2ND) semester*					
21	**Pre –requisite (if any):**	**FMS215 (Physiology I)**					
21	**Co –requisite (if any):**	**Nil**					
21	**Program (s) in which the course is offered:**	**All Bachelor programs offered by the faculty of Medical sciences**					
21	**Language of teaching the course:**	**ENGLISH**					
21	**Location of teaching the course:**	**at the university facility**					
21	**Prepared by**						
22	**Date of Approval**						

L: lecturing ; Tut: Tutorial , S: seminar ; P: practical ; Tr.: training

XXIII. Course Description:

(Physiology II) is the complement of a previous course (Physiology I) and both are designed to provide the student with knowledge the mechanisms of normal body functions. This course functions and regulations of vital organs/systems in the body including: blood, cardiovascular respiratory, alimentary, renal and immunity system

The two physiology courses are required prior to " pathology" course which concerns with changes in the normal functions of body tissue, organs and systems and lead to formation of diseases. The practical part of the course provides the student with the skill to measure biological signs related to blood, cardiovascular and respiratory systems

(علم وظائف الأعضاء 2) هو مقرر دراسي مكملً لمقرر سابق (علم وظائف الأعضاء 1) وقد تم تصميم كلا المقررين لتزويد الطالب بالمعرفة في آليات وظائف الجسم الطبيعية. يركز هذا المقرر على وظائف وأنظمة الأجهزة الحيوية في الجسم بما في ذلك : الدم والجهاز القلبي الوعائي والجهاز التنفسي والجهاز الهضمي والجهاز الكلوي والجهاز المناعي. يعتبر المقررين (علم وظائف الأعضاء 1 و 2) هامين قبل دراسة مقرر "علم الأمراض" الذي يتعلق بالتغيرات التي تؤدي إلى تكوين الأمراض و التي تحدث في الوظائف الطبيعية لأنسجة وأعضاء و أجهزة الجسم و يزود الجزء العملي الطالب بمهارات قياس العلامات الحيوية و الصفات ذات الصلة بالدم و الجهاز الوعائي و التنفسي

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

12. Alignment CILOs to PILOs

Knowledge & understanding: Upon successful completion of the course, students will be able to:

PILOs		CILOs
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Discuss the concept of mechanisms observed in normal functions of human body organs.
		a2. . Identify the regulation of blood, cardiovascular respiratory, alimentary, renal and immunity system
		a3. Determine the normal functions and regulation of blood, cardiovascular respiratory, alimentary, renal and immunity system
		a4. Explain the biological role of certain endogenous substances in regulation the normal functions of blood, cardiovascular respiratory, alimentary, renal and immunity system.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.**Identify the signs of normal functions of blood, cardiovascular respiratory, alimentary, renal and immunity system
		b2. Interpret the outcomes of normal functions of blood, cardiovascular respiratory, alimentary, renal and immunity system
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle safely and effectively the materials in physiology Lab
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2**. Operate effectively the instruments in physiology lab. to measure biological signs.

C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d2.** Participate efficiently with his colleagues in a team work.

13. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Discuss the concept of mechanisms observed in normal functions of human body organs.	**Active Lecture**	**written exams**
a2. . Identify the regulation of blood, cardiovascular respiratory, alimentary, renal and immunity system		
a3. Determine the normal functions and regulation of blood, cardiovascular respiratory, alimentary, renal and immunity system		
a4. Explain the biological role of certain endogenous substances in regulation the normal functions of blood, cardiovascular respiratory, alimentary, renal and immunity system.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Identify the signs of normal functions of blood, cardiovascular respiratory, alimentary, renal and immunity system	**Active Lecture, Feed-back learning, Group-project.**	**Written exam, quizzes, assignments**
b2. Interpret the outcomes of normal functions of blood, cardiovascular respiratory, alimentary, renal and immunity system		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Operate effectively the instruments in physiology lab. to measure biological signs.	**Lab. practice**	**Lab. term works, final practical exam**
c2 . Search efficiently for information using documented and electronic sources of information.	**Feed-back learning, Group-project**	**Assignments**
c3 . Search efficiently for information using documented and electronic sources of information.		
c4. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the skills of time management and self-learning.	**Group-project , feed-back learning**	**Assignment**
d2. Participate efficiently with his colleagues in a team work.		

XXI. Course Content:

A- Theoretical aspect

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Blood**	a1, a2, a3, a4, b1, b2	• Blood composition, functions and regulation of plasma, RBCs, WBCs and platelets. • Circulation: regulations and factors affecting venous return and blood flow.	2	4
2	**Cardiovascular system**	a1, a2, a3, a4, b1, b2	• the heart: functions and regulation of the heart work, physiologic parameters of the heart work: heart rate, cardiac output, heat rhythmicity, conductivity, contraction • Blood vessels: functions and regulation of the blood vessels (veins, arteries, capillaries), physiologic parameters of the blood vessels : blood pressure, peripheral vascular resistance.	3	6
3	**Respiratory system**	a1, a2, b1, b2, b3, b4, b5, d2	• blood-gas interface, airways, the pleura, mechanism of breathing, Ventilation, Diffusion , Partial pressures of oxygen and carbon dioxide, Ventilation–perfusion matching, Gas transport in blood , Regulation of ventilation, Ventilator response to exercise.	2	4
				1	2
4	**Alimentary system**	a1, a2, a3, a4, b1, b2	• functions and regulations of the mouth, pharynx and the gastrointestinal tract (esophagus, stomach, small and large intestine • the digestive system associated – organs: the liver, gall bladder., spleen and pancreases	3	6

5	**Renal system**	a1, a2, a3, a4, b1, b2	• basic unit of the kidney • renal blood flow, glomerular filtration, active excretion tubular reabsorption, • regulation of plasma volume and plasma osmolality	1	2
6	**immune system**	a1, a2, a3, a4, b1, b2	• Definition , functions • Passive immunity and involved mechanisms and cells: naturally acquired, artificially acquired, transfer of activated T-cells • Active immunity and involved cells and mechanism naturally acquired, artificially acquired,	4	8
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	6 Units

B- Practical aspect

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Intended Learning Outcomes CILOs
85.	Taking blood samples and testing the osmotic fragility and permeability properties of red blood cells	**1**	**2**	c1, c2, d1, d2
86.	Measurement of the bleeding time and clotting time from blood samples	**1**	**2**	c1, c2, d1, d2
87.	Identification of blood cells	**1**	**2**	
88.	Measurement of blood pressure and heart rate	**1**	**2**	c1, c2, d1, d2
89.	Electrocardiogram	**1**	**2**	c1, c2, d1, d2
90.	Artificial respiration and cardiac resuscitation	**1**	**2**	c1, c2, d1, d2
91.	Measurement of respiratory rate	**1**	**2**	c1, c2, d1, d2
92.	Measurement of lung volume	**1**	**2**	c1, c2, d1, d2
PRACTICAL EXAM		**1**	**2**	c1, c2
Total		**8**	**18**	

XXIII. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XXVII. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to do a search on one endogenous mediator that is involved in one of the physiological studied and provide a summary report on it.	b1, b2, c1, c2, d1, d2	4-13	6
2	**Group** : each group of students will be assigned to do a search on one of the physiological processes studied and make a summary report.	b1, b2, c1, c2, d1, d2	13	4

VII. Schedule of Assessment Tasks for Students During the Semester

A- Theoretical part

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2
		Assignments	7, 12	5	5	b1, b2, c1, c2, d1, d2
2	Mid-semester exam (written exam)		7	10	10	10
3	Final exam of (written exam)		16	50	50	50
			TOTAL	70	70 %	

Practical part assessment						
No.	**Assessment Method**		**Week Due**	**Mark**	**Proportion to Total course Assessment**	**Aligned Course Learning Outcomes(CILOs)**
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	
			Total	30	30 %	

XXIV. Learning Resources:

1- Required Textbook(s) (maximum two).

John E. Hall and Arthur C. Guyton. Guyton and Hall Textbook of Medical Physiology. 2010, Elsevier Health Sciences

2- Essential References.

Anne Waugh and Allison Grant · Ross & Wilson Anatomy and Physiology in Health and Illness. 2018., Elsevier Health Sciences

3- Electronic Materials and Web Sites *etc*.

1. http://course.sdu.edu.cn/G2S/Template/View.aspx?courseId=1546&topMenuId=157644&action=view&type=&name=&menuType=1

2- https://assets.openstax.org/oscms-prodcms/media/documents/AnatomyandPhysiology-OP.pdf

3- http://repo.jfn.ac.lk/med/bitstream/701/830/1/Manual%20for%20Medical%20Phys%20Pract%202014.pdf

XII. Course Policies:	
13.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
14.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
15.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
16.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of **PHYSIOLOGY II**

I. Course Identification and General Information:

1.	Course Title:	PHYSIOLOGY II					
2.	Course Code:	FMS223					
3.	Credit hours:	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	3
4.	Study level/ semester at which this course is offered:	*(2ND) Year – (2ND) semester*					
5.	Pre –requisite (if any):	FMS215 (Physiology I)					
6.	Co –requisite (if any):	Nil					
7.	Program (s) in which the course is offered:	All Bachelor programs offered by the faculty of Medical sciences					
8.	Language of teaching the course:	ENGLISH					
9.	Location of teaching the course:	at the university facility					
10	Prepared by						
11	Date of Approval	2020					

II. Course Description:

(Physiology II) is the complement of a previous course (Physiology I) and both are designed to provide the student with knowledge the mechanisms of normal body functions. This course functions and regulations of vital organs/systems in the body including: blood, cardiovascular respiratory, alimentary, renal and immunity system

The two physiology courses are required prior to " pathology" course which concerns with changes in the normal functions of body tissue, organs and systems and lead to formation of diseases. The practical part of the course provides the student with the skill to measure biological signs related to blood, cardiovascular and respiratory systems

(علم وظائف الأعضاء 2) هو مقرر دراسي مكملً لمقرر سابق (علم وظائف الأعضاء 1) وقد تم تصميم كلا المقررين لتزويد الطالب بالمعرفة في آليات وظائف الجسم الطبيعية. يركز هذا المقرر على وظائف وأنظمة الأجهزة الحيوية في الجسم بما في ذلك : الدم والجهاز القلبي الوعائي والجهاز التنفسي والجهاز الهضمي والجهاز الكلوي والجهاز المناعي. يعتبر المقررين (علم وظائف الأعضاء 1 و 2) هامين قبل دراسة مقرر "علم الأمراض" الذي يتعلق بالتغيرات التي تؤدي إلى تكوين الأمراض و التي تحدث في الوظائف الطبيعية لأنسجة وأعضاء و أجهزة الجسم و يزود الجزء العملي الطالب بمهارات قياس العلامات الحيوية و الصفات ذات الصلة بالدم و الجهاز الوعائي و التنفسي

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

Knowledge & understanding: Upon successful completion of the course, students will be able to:

PILOs		CILOs
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Discuss the concept of mechanisms observed in normal functions of human body organs.
		a2. . Identify the regulation of blood, cardiovascular respiratory, alimentary, renal and immunity system
		a3. Determine the normal functions and regulation of blood, cardiovascular respiratory, alimentary, renal and immunity system
		a4. Explain the biological role of certain endogenous substances in regulation the normal functions of blood, cardiovascular respiratory, alimentary, renal and immunity system.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.**Identify the signs of normal functions of blood, cardiovascular respiratory, alimentary, renal and immunity system
		b2. Interpret the outcomes of normal functions of blood, cardiovascular respiratory, alimentary, renal and immunity system
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle safely and effectively the materials in physiology Lab
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2**. Operate effectively the instruments in physiology lab. to measure biological signs.
C7	Conduct research and utilize the results in different pharmaceutical	**c3 .**Search efficiently for information using documented and electronic sources of information.

	fields.	**c4.** Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d2.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Discuss the concept of mechanisms observed in normal functions of human body organs.	**Active Lecture**	**written exams**
a2. . Identify the regulation of blood, cardiovascular respiratory, alimentary, renal and immunity system		
a3. Determine the normal functions and regulation of blood, cardiovascular respiratory, alimentary, renal and immunity system		
a4. Explain the biological role of certain endogenous substances in regulation the normal functions of blood, cardiovascular respiratory, alimentary, renal and immunity system.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Identify the signs of normal functions of blood, cardiovascular respiratory, alimentary, renal and immunity system	**Active Lecture, Feed-back learning, Group-project.**	**Written exam, quizzes, assignments**
b2. Interpret the outcomes of normal functions of blood, cardiovascular respiratory, alimentary, renal and immunity system		

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Operate effectively the instruments in physiology lab. to measure biological signs.	**Lab. practice**	**Lab. term works, final practical exam**
c2 . Search efficiently for information using documented and electronic sources of information.	**Feed-back learning, Group-project**	**Assignments**
c3 . Search efficiently for information using documented and electronic sources of information.		
c4. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the skills of time management and self-learning.	**Group-project , feed-back learning**	**Assignment**
d2. Participate efficiently with his colleagues in a team work.		

IV. Course Content:

A- Theoretical aspect

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Blood**	a1, a2, a3, a4, b1, b2	• Blood composition, functions and regulation of plasma, RBCs, WBCs and platelets. • Circulation: regulations and factors affecting venous return and blood flow.	2	4
2	**Cardiovascular system**	a1, a2, a3, a4, b1, b2	• the heart: functions and regulation of the heart work, physiologic parameters of the heart work: heart rate, cardiac output, heat rhythmicity, conductivity, contraction	3	6

			• Blood vessels: functions and regulation of the blood vessels (veins, arteries, capillaries), physiologic parameters of the blood vessels : blood pressure, peripheral vascular resistance.		
3	**Respiratory system**	a1, a2, b1, b2, b3, b4, b5, d2	• blood-gas interface, airways, the pleura, mechanism of breathing, Ventilation, Diffusion , Partial pressures of oxygen and carbon dioxide, Ventilation–perfusion matching, Gas transport in blood , Regulation of ventilation, Ventilator response to exercise.	2	4
				1	2
4	**Alimentary system**	a1, a2, a3, a4, b1, b2	• functions and regulations of the mouth, pharynx and the gastrointestinal tract (esophagus, stomach, small and large intestine • the digestive system associated – organs: the liver, gall bladder., spleen and pancreases	3	6
5	**Renal system**	a1, a2, a3, a4, b1, b2	• basic unit of the kidney • renal blood flow, glomerular filtration, active excretion tubular reabsorption, • regulation of plasma volume and plasma osmolality	1	2
6	**immune system**	a1, a2, a3, a4, b1, b2	• Definition , functions • Passive immunity and involved mechanisms and cells: naturally acquired, artificially acquired, transfer of activated T-cells • Active immunity and involved cells and mechanism naturally acquired, artificially acquired,	4	8
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	6 Units

B- Practical aspect

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Intended Learning Outcomes CILOs
1.	Taking blood samples and testing the osmotic fragility and permeability properties of red blood cells	**1**	**2**	c1, c2, d1, d2
2.	Measurement of the bleeding time and clotting time from blood samples	**1**	**2**	c1, c2, d1, d2
3.	Identification of blood cells	**1**	**2**	
4.	Measurement of blood pressure and heart rate	**1**	**2**	c1, c2, d1, d2
5.	Electrocardiogram	**1**	**2**	c1, c2, d1, d2
6.	Artificial respiration and cardiac resuscitation	**1**	**2**	c1, c2, d1, d2
7.	Measurement of respiratory rate	**1**	**2**	c1, c2, d1, d2
8.	Measurement of lung volume	**1**	**2**	c1, c2, d1, d2
PRACTICAL EXAM		**1**	**2**	c1, c2
Total		**8**	**18**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to do a search on one endogenous mediator that is involved in one of the physiological studied and provide a summary report on it.	b1, b2, c1, c2, d1, d2	4-13	6
2	**Group** : each group of students will be assigned to do a search on one of the physiological processes studied and make a summary report.	b1, b2, c1, c2, d1, d2	13	4

VII. Schedule of Assessment Tasks for Students During the Semester

A- Theoretical part

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2
		Assignments	7, 12	5	5	b1, b2, c1, c2, d1, d2
2	Mid-semester exam (written exam)		7	10	10	10
3	Final exam of (written exam)		16	50	50	50
			TOTAL	70	70 %	

Practical part assessment						
No.	**Assessment Method**		**Week Due**	**Mark**	**Proportion to Total course Assessment**	**Aligned Course Learning Outcomes(CILOs)**
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

John E. Hall and Arthur C. Guyton. Guyton and Hall Textbook of Medical Physiology. 2010, Elsevier Health Sciences

2- Essential References.

Anne Waugh and Allison Grant · Ross & Wilson Anatomy and Physiology in Health and Illness. 2018., Elsevier Health Sciences

3- Electronic Materials and Web Sites *etc*.

1. http://course.sdu.edu.cn/G2S/Template/View.aspx?courseId=1546&topMenuId=157644&action=view&type=&name=&menuType=1

2- https://assets.openstax.org/oscms-prodcms/media/documents/AnatomyandPhysiology-OP.pdf

3- http://repo.jfn.ac.lk/med/bitstream/701/830/1/Manual%20for%20Medical%20Phys%20Pract%202014.pdf

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

General Pharmacognosy I

Course Code (**PHR311**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XXIV. Course Identification and General Information:

22	**Course Title:**	**General Pharmacognosy I**					
22	**Course Code:**	**PHR311**					
22	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
22	**Study level/ semester at which this course is offered:**	*(3RD) Year – (1ST) semester*					
22	**Pre –requisite (if any):**						
22	**Co –requisite (if any):**	**none**					
22	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**					
22	**Language of teaching the course:**	**ENGLISH**					
22	**Location of teaching the course:**	**At the university facility**					
23	**Prepared by**						
23	**Date of Approval**						

L: lecturing; Tut: Tutorial, S: seminar; P: practical; Tr.: training

XXV. Course Description:

The course provides the student with fundamental knowledge in plants as a natural source of drugs. It focuses on the principles and procedures applied for cultivation, collection and processing of plants as crude drugs and the methods used for detection of active constituents and discovering adulteration of medicinal plants. It also provide detailed knowledge on identification features and medical uses of leaves, barks, roots and rhizomes that have scientific-based evidences to be used as complementary and alternative medicines. The practical part of the course provides the student with skills to handle and prepare of plant samples for morphological and microscopical identification tests.

يزود المقرر الطالب بالمعرفة الأساسية بالنباتات كأحد المصادر الطبيعية للأدوية و يهتم المقرر بالمبادئ والإجراءات المطبقة في زراعة وجمع النباتات كأدوية خام والطرق المستخدمة للكشف عن المكونات الفعالة فيها و الكشف عن حالات غشها , كما يوفر معلومات مفصلة عن سمات الهوية والاستخدامات الطبية للأجزاء النباتية (الأوراق واللحاء والجذور و الجذامير) ر التي لها أدلة علمية لاستخدامها كأدوية تكميلية وبديلة و يزود الجزء العملي من المقرر الطالب بالمهارات اللازمة للتعامل مع عينات النباتات وتحضيرها لاختبارات التعرف الظاهرية و المجهرية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

14. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A4	Describe analytical methods, principles, design and development techniques	**a1**. Explicit the methods used for detection of active constituents and discovering adulteration of medicinal plants.
		a2. Discuss the principles and procedures applied for cultivation, collection and processing of plants as crude drugs.
A6	Explain the basis of complementary and alternative medicines	**a3.** Identify the botanical origin, morphological and microscopical characteristics of common medicinal leaves, barks, roots and rhizomes.
		a4. Determine the active constituents and therapeutic use of medicinal leaves, barks, roots and rhizomes.
A10	Describe the pharmacists role in different pharmacy practices.	**a5.** Describe his/her role as pharmacist in identification and evaluation of medicinal plants
Intellectual skills: Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Express with drawings the morphology and key microscopical features of medicinal plants
		b2. Differentiate between medicinal leaves, barks, roots and rhizomes based on morphological and microscopical features.
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3**. Classify active constituents in medicinal plants.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b4.** Select standard operation procedures to identify medicinal plants and crude drugs
Professional & practical skills: Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory

	products.	**c2.** Operate the instruments and perform experiments successfully in the laboratory.
C3	Screen for drugs from different sources and carry out pharmacy relevant experiments successfully.	**c3.** Prepare plant samples and investigate the morphological and microscopical features in medicinal leaves, barks, roots and rhizomes
C7	Conduct research and utilize the results in different pharmaceutical fields	**c4 .**Search efficiently for information using documented and electronic sources of information.
		c5 Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

15. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explicit the methods used for detection of active constituents and discovering adulteration of medicinal plants.	**Active Lecture**	**Written exams**
a2. Discuss the principles and procedures applied for cultivation, collection and processing of plants as crude drugs.		
a3. Identify the botanical origin, morphological and microscopical characteristics of common medicinal leaves, barks, roots and rhizomes.		
a4. Determine the active constituents and therapeutic use of medicinal leaves, barks, roots and rhizomes.		
a5. Describe his/her role as pharmacist in identification and evaluation of medicinal plants		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Express with drawings the morphology and key microscopical features of medicinal plants	**Active Lecture, laboratory practice**	**Written exam , lab. term work, final practical exam**
b2. Differentiate between medicinal leaves, barks, roots and rhizomes based on morphological and microscopical features.	**laboratory practice**	**lab. term work, final practical exam**
b4. Select standard operation procedures to identify medicinal plants and crude drugs		
b3 . Classify active constituents in medicinal plants.	**Active Lecture , feed-back learning**	**Written exams quizzes**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term work, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory.		
c3. Prepare plant samples and investigate the		

morphological and microscopical features in medicinal leaves, barks, roots and rhizomes		
c4 . Search efficiently for information using documented and electronic sources of information.	**Feed-back learning , Group-project**	**Assignments**
c5 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice** **Feed-back learning**	Lab. term work, final practical exam, Assignments
d2. Demonstrate the skills of time management and self-learning.		
d3. Participate efficiently with his colleagues in a team work.		

XXII. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, a2, a3, a4, a5, b1, b3	□ Definition, importance, and function, brief history □ Crude, official and unofficial drugs. □ Nomenclature of crude drugs (botanical, geographical and commercial sources of drugs) □ Classification of crude drugs (alphabetical, taxonomical, morphological, pharmacological and chemical) □ Cultivation (Disadvantages of collecting wild plants and advantages of cultivation, factors affecting cultivation). □ Collection (Time of the year, time of the day, stage of the development of the plant and general rules of collection). □ Post-collection processing of crude drugs: Drying (Natural methods, artificial methods, changes occurring after drying), Preservation and protection of crude drugs (deterioration during storage, physicochemical factors, biological factors, methods to destroy and control of insects) □ Adulteration(sophistication, substitution, admixture and deterioration, determination of adulteration.)	6	12
MID-TERM EXAM				1	2
3	**Medicinal leaves**	a1, a2, a3, a4, a5, b1, b3	Study of botanical origin, microscopical features, cultivation, adulteration detection, active constituents and medical uses of the following medicinal leaves: Digitalis, Senna, Stramonium,	3	6

			Belladonna, Hyoscymus, Bucho, Boldo , Coca, Jaborandi, Henna.		
4	**Medicinal barks**	a1, a2, a3, a4, a5, b1, b3	Study of botanical origin, microscopical features, cultivation, adulteration detection, active constituents and medical uses of the followingmedicinal barks:Cinchona, Cinnamon, Frangula, Quillaia, Pomegranate, Hamamelis and Galls.	2	4
5	**Medicinal roots and rhizomes**	a1, a2, a3, a4, a5, b1, b3	Study of botanical origin, microscopical features, cultivation, adulteration detection, active constituents and medical uses of the following medicinal roots and rhizomes :Liquorice,Ipecacuanha,Rauwolfia,Senega,Ginger,Colchicum,Squill,Ginseng,Rhubarb,Curcuma,Podophylum,Aconite,Veratrum,Sasaparilla,Kava-kava	2	4
Course Review		a1, a2, a3, a4, a5, b1, b3	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	5 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
93.	preparation of hard parts of plant(e.g. roots, seeds), for investigation : drying, grinding, treating with reagents , etc	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
94.	preparation of soft parts of plant(e.g. leaves, flowers), for investigation : drying, grinding, treating with reagents , etc.	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
95.	microscopical Detection of types of calcium oxalate in plant	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
96.	microscopical Detection of types of starch in plant	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
97.	morphology and microscopical determination of medicinal leaves : senna leaves	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
98.	morphology and microscopical determination of medicinal leaves : Henna leaves	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
99.	morphology and microscopical determination of medicinal barks : cinnamon bark	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
100.	morphology and microscopical determination of medicinal barks : pomegranate bark	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
101.	morphology and microscopical determination of medicinal roots & rhizomes: Ginger	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
102.	morphology and microscopical determination of medicinal roots & rhizomes: licorice	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
103.	Review	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
Total		**12**	**24 equivalent to 12 credit hours**	
Number of Weeks			**12**	

XXIV. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to do a search on the pharmaceutical products available in the drug market of one plant drug studied in the course.	c4, c5, d2	4-13	3
2	**Group:** each group of students will be assigned to do search report for adulteration of one crude drug studied in the course.	c4, c5, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b3
		Assignments	7, 12	5	5	c4, c5, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a3, a4, a5, b1, b3
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, a4, a5, b1, b3
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b1, b2, b4, c1, c2, c3, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	b1, b2, b4, c1, c2, c3, d2
			Total	30	30 %	

XXV. Learning Resources:

1- Required Textbook(s) (maximum two).

Michael Heinrich , Joanne Barnes, et al. Fundamentals of Pharmacognosy and Phytotherapy, 2018, Elsevier.

2- Essential References.

Biren Shah and Avinash Seth ·Textbook of Pharmacognosy and Phytochemistry. 2018, Elsevier - Health Sciences Division.

3- Electronic Materials and Web Sites *etc*.

1- https://annamalaiuniversity.ac.in/studport/download/engg/pharm/resources/BPHARM_2Y_4S_405T_Pharmacognosy%20&%20Phytochemistry-I.pdf
2- https://jru.edu.in/studentcorner/lab-manual/dpharm/1st-year/Pharmacognosy.pdf

XIII. Course Policies:

17.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
18.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
19.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
20.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

General Pharmacognosy I

I. Course Identification and General Information:

1.	**Course Title:**	**General Pharmacognosy I**					
2.	**Course Code:**	**PHR311**					
3.	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
4.	**Study level/ semester at which this course is offered:**	*(3RD) Year – (1ST) semester*					
5.	**Pre –requisite (if any):**						
6.	**Co –requisite (if any):**	**none**					
7.	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**					
8.	**Language of teaching the course:**	**ENGLISH**					
9.	**Location of teaching the course:**	**At the university facility**					
10	**Prepared by**						
11	**Date of Approval**						

II. Course Description:

The course provides the student with fundamental knowledge in plants as a natural source of drugs. It focuses on the principles and procedures applied for cultivation, collection and processing of plants as crude drugs and the methods used for detection of active constituents and discovering adulteration of medicinal plants. It also provide detailed knowledge on identification features and medical uses of leaves, barks, roots and rhizomes that have scientific-based evidences to be used as complementary and alternative medicines. The practical part of the course provides the student with skills to handle and prepare of plant samples for morphological and microscopical identification tests.

يزود المقرر الطالب بالمعرفة الأساسية بالنباتات كأحد المصادر الطبيعية للأدوية و يهتم المقرر بالمبادئ والإجراءات المطبقة في زراعة وجمع النباتات كأدوية خام والطرق المستخدمة للكشف عن المكونات الفعالة فيها و الكشف عن حالات غشها , كما يوفر معلومات مفصلة عن سمات الهوية والاستخدامات الطبية للأجزاء النباتية (الأوراق واللحاء والجذور و الجذامير) ر التي لها أدلة علمية لاستخدامها كأدوية تكميلية وبديلة و يزود الجزء العملي من المقرر الطالب بالمهارات اللازمة للتعامل مع عينات النباتات وتحضيرها لاختبارات التعرف الظاهرية و المجهرية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A4	Describe analytical methods, principles, design and development techniques	**a1**. Explicit the methods used for detection of active constituents and discovering adulteration of medicinal plants.
		a2. Discuss the principles and procedures applied for cultivation, collection and processing of plants as crude drugs.
A6	Explain the basis of complementary and alternative medicines	**a3.** Identify the botanical origin, morphological and microscopical characteristics of common medicinal leaves, barks, roots and rhizomes.
		a4. Determine the active constituents and therapeutic use of medicinal leaves, barks, roots and rhizomes.
A10	Describe the pharmacists role in different pharmacy practices.	**a5.** Describe his/her role as pharmacist in identification and evaluation of medicinal plants
Intellectual skills: Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Express with drawings the morphology and key microscopical features of medicinal plants
		b2. Differentiate between medicinal leaves, barks, roots and rhizomes based on morphological and microscopical features.
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3 .**Classify active constituents in medicinal plants.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b4.** Select standard operation procedures to identify medicinal plants and crude drugs
Professional & practical skills: Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory

	products.	**c2.** Operate the instruments and perform experiments successfully in the laboratory.
C3	Screen for drugs from different sources and carry out pharmacy relevant experiments successfully.	**c3.** Prepare plant samples and investigate the morphological and microscopical features in medicinal leaves, barks, roots and rhizomes
C7	Conduct research and utilize the results in different pharmaceutical fields	**c4 .**Search efficiently for information using documented and electronic sources of information.
		c5 Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explicit the methods used for detection of active constituents and discovering adulteration of medicinal plants.	**Active Lecture**	**Written exams**
a2. Discuss the principles and procedures applied for cultivation, collection and processing of plants as crude drugs.		
a3. Identify the botanical origin, morphological and microscopical characteristics of common medicinal leaves, barks, roots and rhizomes.		
a4. Determine the active constituents and therapeutic use of medicinal leaves, barks, roots and		

rhizomes.		
a5. Describe his/her role as pharmacist in identification and evaluation of medicinal plants		
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Express with drawings the morphology and key microscopical features of medicinal plants	**Active Lecture, laboratory practice**	**Written exam , lab. term work, final practical exam**
b2. Differentiate between medicinal leaves, barks, roots and rhizomes based on morphological and microscopical features.	**laboratory practice**	**lab. term work, final practical exam**
b4. Select standard operation procedures to identify medicinal plants and crude drugs		
b3 . Classify active constituents in medicinal plants.	**Active Lecture , feed-back learning**	**Written exams quizzes**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term work, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory.		
c3. Prepare plant samples and investigate the morphological and microscopical features in medicinal leaves, barks, roots and rhizomes		
c4 . Search efficiently for information using documented and electronic sources of information.	**Feed-back learning , Group-project**	**Assignments**
c5 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice** **Feed-back learning**	Lab. term work, final practical exam, Assignments
d2. Demonstrate the skills of time management and self-learning.		
d3. Participate efficiently with his colleagues in a team work.		

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, a2, a3, a4, a5, b1, b3	□ Definition, importance, and function, brief history □ Crude, official and unofficial drugs. □ Nomenclature of crude drugs (botanical, geographical and commercial sources of drugs) □ Classification of crude drugs (alphabetical, taxonomical, morphological, pharmacological and chemical) □ Cultivation (Disadvantages of collecting wild plants and advantages of cultivation, factors affecting cultivation). □ Collection (Time of the year, time of the day, stage of the development of the plant and general rules of collection). □ Post-collection processing of crude drugs: Drying (Natural methods, artificial methods, changes occurring after drying), Preservation and protection of crude drugs (deterioration during storage, physicochemical factors, biological factors, methods to destroy and control of insects) □ Adulteration(sophistication, substitution, admixture and deterioration, determination of adulteration.)	6	12
MID-TERM EXAM				1	2
3	**Medicinal leaves**	a1, a2, a3, a4, a5, b1, b3	Study of botanical origin, microscopical features, cultivation, adulteration detection, active constituents and medical uses of the following medicinal leaves:	3	6

			Digitalis, Senna, Stramonium, Belladonna, Hyoscymus, Bucho, Boldo , Coca, Jaborandi, Henna.		
4	**Medicinal barks**	a1, a2, a3, a4, a5, b1, b3	Study of botanical origin, microscopical features, cultivation, adulteration detection, active constituents and medical uses of the followingmedicinal barks:Cinchona, Cinnamon, Frangula, Quillaia, Pomegranate, Hamamelis and Galls.	2	4
5	**Medicinal roots and rhizomes**	a1, a2, a3, a4, a5, b1, b3	Study of botanical origin, microscopical features, cultivation, adulteration detection, active constituents and medical uses of the following medicinal roots and rhizomes :Liquorice,Ipecacuanha,Rauwolfia,Senega,Ginger,Colchicum,Squill,Ginseng,Rhubarb,Curcuma,Podophylum,Aconite,Veratrum,Sasaparilla,Kava-kava	2	4
Course Review		a1, a2, a3, a4, a5, b1, b3	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	5 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	preparation of hard parts of plant(e.g. roots, seeds), for investigation : drying, grinding, treating with reagents , etc	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
2.	preparation of soft parts of plant(e.g. leaves, flowers), for investigation : drying, grinding, treating with reagents , etc.	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
3.	microscopical Detection of types of calcium oxalate in plant	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
4.	microscopical Detection of types of starch in plant	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
5.	morphology and microscopical determination of medicinal leaves : senna leaves	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
6.	morphology and microscopical determination of medicinal leaves : Henna leaves	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
7.	morphology and microscopical determination of medicinal barks : cinnamon bark	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
8.	morphology and microscopical determination of medicinal barks : pomegranate bark	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
9.	morphology and microscopical determination of medicinal roots & rhizomes: Ginger	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
10.	morphology and microscopical determination of medicinal roots & rhizomes: licorice	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
11.	Review	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
Total		**12**	**24 equivalent to 12 credit hours**	
Number of Weeks			**12**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to do a search on the pharmaceutical products available in the drug market of one plant drug studied in the course.	c4, c5, d2	4-13	3
2	**Group** : each group of students will be assigned to do search report for adulteration of one crude drug studied in the course.	c4, c5, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b3
		Assignments	7, 12	5	5	c4, c5, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a3, a4, a5, b1, b3
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, a4, a5, b1, b3
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b1, b2, b4, c1, c2, c3, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	b1, b2, b4, c1, c2, c3, d2
Total				30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Michael Heinrich , Joanne Barnes, et al. Fundamentals of Pharmacognosy and Phytotherapy, 2018, Elsevier.

2- Essential References.

Biren Shah and Avinash Seth ·Textbook of Pharmacognosy and Phytochemistry. 2018, Elsevier - Health Sciences Division.

3- Electronic Materials and Web Sites *etc*.

1- https://annamalaiuniversity.ac.in/studport/download/engg/pharm/resources/BPHARM_2Y_4S_405T_Pharmacognosy%20&%20Phytochemistry-I.pdf
2- https://jru.edu.in/studentcorner/lab-manual/dpharm/1st-year/Pharmacognosy.pdf

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

Medicinal Chemistry I

Course Code (**PHR314**)

XXVI. Course Identification and General Information:

23	**Course Title:**	**MEDICINAL CHEMISTRY I**					
23	**Course Code &Number:**	**PHR314**					
23	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
23	**Study level/ semester at which this course is offered:**	*(Third) Year – (first) semester*					
23	**Pre –requisite (if any):**						
23	**Co –requisite (if any):**	**PHR313 (Pharmacology & Therapeutics I)**					
23	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**					
23	**Language of teaching the course:**	**ENGLISH**					
24	**Location of teaching the course:**	**At the university facility**					
24	**Date of Approval**						

L: lecturing ; Tut: Tutorial , S: seminar ; P: practical ; Tr.: training

XXVII. Course Description:

This course is the first among (Medicinal chemistry) courses which are designed to provide knowledge and skills in chemistry of medicinal agents (drugs). The first part of the course deals with an introduction to drug design, stereochemistry and chemistry of drug metabolism while the second part deals with the physicochemical properties, chemical synthesis, structure activity relationship (SAR), pharmacophore molecules and metabolism of drugs affecting autonomic nervous system and autacoids. The practical part provides the student the skill to identify the physicochemical, spectroscopic, chromatographic specification of the drugs under study The course is co-requisite with (Pharmacology & Therapeutics I) as both deals with the same medicinal agents.

هذا المقرر هو الأول بين مقررات (الكيمياء الدوائية) التي ستزود الطالب بالمعرفة و المهارات اللازمة في كيمياء الدواء و يتناول هذا المقرر أولا : مقدمة لتصميم الأدوية والكيمياء الفراغية وكيمياء التمثيل الغذائي للدواء و ثانيا : الخواص الفيزيائية والكيميائية و التخليق الكيميائي وعلاقة الخواص الدوائية بالتركيب الكيميائي (SAR) واستقلاب الأدوية التي تؤثر على الجهاز العصبي اللاإرادي وعلى الأدوية التي تؤثر على العوامل الحيوية التي تعمل كهرمونات موضعية (autacoids) , ويزود الجزء العملي الطالب مهارة التعرف على المواصفات الفيزيائية والكيميائية والطيفية والكروماتوجرافية للأدوية قيد الدراسة. يعد هذا المقرر متطلبًا مشتركًا مع (علم الأدوية والتداوي 1) حيث يركز كلاهما على نفس الأدوية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding : Upon successful completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.
A4	Describe analytical methods, principles, design and development techniques	**a2.** Explain the principles of synthesis, purification and metabolic reactions of drugs affecting autonomic nervous system, autacoids and respiratory system.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in chemical synthesis of drugs.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the rules of structure-activity relationship to construct pharmacophore of drugs affecting autonomic nervous system, autacoids and respiratory system.
		b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3.** Classify, chemically, the drugs affecting autonomic nervous system, autacoids and respiratory system.
		b4. Compare between chemically related drugs based on their chemical structure
B3	. Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b5.** Design newer drugs affecting autonomic nervous system, autacoids and respiratory system using structure activity relationship rules.

Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4 Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.	**Active Lecture**	**Written exams**
a2. Explain the principles of synthesis, purification and metabolic reactions of drugs affecting autonomic nervous system, autacoids and respiratory system.		
a3. Describe the role of pharmacist in chemical synthesis of drugs.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret the rules of structure-activity relationship to construct pharmacophore of drugs affecting autonomic nervous system, autacoids and respiratory system.	**Active Lecture, feed-back learning**	**Written exams , quizzes**
b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing	**Active Lecture**	**Written exams**
b3. Classify, chemically, the drugs affecting autonomic nervous system, autacoids and respiratory system.		
b4 . Compare between chemically related drugs based on their chemical structure		
b5. Design newer drugs affecting autonomic nervous system, autacoids and respiratory system using structure activity relationship rules.	**Group-project**	**Assignments**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**Group-project**	**Assignments**
c4 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Lab. term works, assignment**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**laboratory practice**	**Lab. term works, final practical exam**

XXIII. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
Part I: Introduction to medicinal chemistry					
1	**Medicinal chemistry roles and concepts**	a1, a2, a3	• definitions, brief history, roles in pharmacy • Basics of combinatorial chemistry and drug design: patent burst, synthesis of fragments, etc. • Pharmacophore and Physicochemical properties in relation to biological activity (structure-activity relationship "SAR").	2	4
2	**Drug-receptor interaction &Stereochemistry of drugs**	a1, a2, a3	• binding and drug-receptor interaction: chemical bonding and biological activity • stereochemical aspects of drug action • isosterism and bioisosterism	2	4
3	**chemistry of Drug metabolism**	a1, a2, a3	• phase I reactions • phase II reactions • Metabolites: inactive, active , more active	2	5
Mid-term exam				1	2

Part II: Chemistry of drugs affecting autonomic systems and skeletal muscles					
4	**Drugs acting on the autonomics nervous system**	a1, a2,a3 , b1, b2, b3, b4	**Physicochemical properties, synthesis, purification, structure-activity relationship, metabolism of drugs acting on sympathetic system** • Indirectly sympatholytic drugs • Directly sympatholytic drugs: adrenergic blocking agents • Indirectly sympatholytic drugs • Directly sympatholytic drugs : adrenergic blocking agents	3	6
		a1, a2,a3 , b1, b2, b3, b4	**Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of drugs acting on parasympathetic system** • Indirectly parasympathomimetics • Direct parasympathomimetics: cholinergic agonists • Indirectly parasympatholytic drugs • Directly sympatholytic drugs: cholinergic blocking agents • **Drugs acting on autonomic ganglia:** Ganglionic stimulants, ganglionic • **Neuromuscular blocking agents**	2	4
5	**Drugs affecting autacoids**	a1, a2,a3 , b1, b2, b3, b4	**Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of drugs acting on parasympathetic system** • Antihistamines • Serotonin agonists and antagonists	3	6
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	5 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
104.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: adrenergic agonist : **adrenaline**	**1**	**2**	c1, c2, d1, d2, d3
105.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: adrenergic blockers : **atenolol**	1	2	c1, c2, d1, d2, d3
106.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: Parasympathomimetics : **neostigmine**	1	2	c1, c2, d1, d2, d3
107.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: cholinergic blockers : **atropine**	**1**	**2**	c1, c2, d1, d2, d3
108.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: skeletal muscle relaxants **suxamethonium**	**1**	**2**	c1, c2, d1, d2, d3
109.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: drugs affecting autacoids disorders : **chlorpheniramine.**	**1**	**2**	c1, c2, d1, d2, d3
110.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: drugs serotonin: **ondansetron**	**1**	**2**	c1, c2, d1, d2, d3
111.	Synthesis of drugs	**2**	**4**	c1, c2, d1, d2, d3
112.	Purification of drugs.	**1**	**2**	c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	c1, c2, d1, d2, d3
Total		**11**	**22**	

XXV. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VII. Assignments:

No	Assignments	Aligned CILOs	Week Due	
2	**Group** : each group of students will be assigned to hypothetically design newer drugs form a studied patent drug using SAR principles	b5, c3, c4, d1, d3	8	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1
		Assignments	7, 12	5	5	b5, c3, c4, d1, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2,a3 , b1, b2, b3, b4
3	Final exam (written exam)		16	50	50	a1, a2,a3 , b1, b2, b3, b4
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	c1, c2, d2
Total				30	30 %	

XXVI. Learning Resources:

1- Required Textbook(s) (maximum two).

V Alagarsamy. Textbook of Medicinal Chemistry, volume I & II, 2013, Elsevier

2- Essential References.

Munendra Mohan Varshney & Asif Husain . A textbook of medicinal chemistry. 2015, I.K. International Publishing House Pvt. Limited

3- Electronic Materials and Web Sites *etc*.

1- https://pubs.acs.org/journal/jmcmar
2- https://benthamscience.com/journals/medicinal-chemistry/
3- https://www.slideserve.com/richard_edik/introduction-to-medicinal-chemistry

XIV. Course Policies:

21.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
22.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
23.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
24.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

Medicinal chemistry I

I. Course Identification and General Information:

1.	**Course Title:**	**MEDICINAL CHEMISTRY I**					
2.	**Course Code &Number:**	**PHR314**					
3.	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
4.	**Study level/ semester at which this course is offered:**	*(Third) Year – (first) semester*					
5.	**Pre –requisite (if any):**						
6.	**Co –requisite (if any):**	**PHR313 (Pharmacology & Therapeutics I)**					
7.	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**					
8.	**Language of teaching the course:**	**ENGLISH**					
9.	**Location of teaching the course:**	**At the university facility**					
10	**Date of Approval**						

II. Course Description:

This course is the first among (Medicinal chemistry) courses which are designed to provide knowledge and skills in chemistry of medicinal agents (drugs). The first part of the course deals with an introduction to drug design, stereochemistry and chemistry of drug metabolism while the second part deals with the physicochemical properties, chemical synthesis, structure activity relationship (SAR), pharmacophore molecules and metabolism of drugs affecting autonomic nervous system and autacoids. The practical part provides the student the skill to identify the physicochemical, spectroscopic, chromatographic specification of the drugs under study The course is co-requisite with (Pharmacology & Therapeutics I) as both deals with the same medicinal agents.

هذا المقرر هو الأول بين مقررات (الكيمياء الدوائية) التي ستزود الطالب بالمعرفة و المهارات اللازمة في كيمياء الدواء و يتناول هذا المقرر أولا : مقدمة لتصميم الأدوية والكيمياء الفراغية وكيمياء التمثيل الغذائي للدواء و ثانيا : الخواص الفيزيائية والكيميائية و التخليق الكيميائي وعلاقة الخواص الدوائية بالتركيب الكيميائي (SAR) واستقلاب الأدوية التي تؤثر على الجهاز العصبي اللاإرادي وعلى الأدوية التي تؤثر على العوامل الحيوية التي تعمل كهرمونات موضعية (autacoids) , ويزود الجزء العملي الطالب مهارة التعرف على المواصفات الفيزيائية والكيميائية والطيفية والكروماتوجرافية للأدوية قيد الدراسة. يعد هذا المقرر متطلبًا مشتركًا مع (علم الأدوية والتداوي 1) حيث يركز كلاهما على نفس الأدوية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding : Upon successful completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.
A4	Describe analytical methods, principles, design and development techniques	**a2.** Explain the principles of synthesis, purification and metabolic reactions of drugs affecting autonomic nervous system, autacoids and respiratory system.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in chemical synthesis of drugs.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the rules of structure-activity relationship to construct pharmacophore of drugs affecting autonomic nervous system, autacoids and respiratory system.
		b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3.** Classify, chemically, the drugs affecting autonomic nervous system, autacoids and respiratory system.
		b4 . Compare between chemically related drugs based on their chemical structure
B3	. Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b5.** Design newer drugs affecting autonomic nervous system, autacoids and respiratory system using structure activity relationship rules.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory

C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4 Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.	**Active Lecture**	**Written exams**
a2. Explain the principles of synthesis, purification and metabolic reactions of drugs affecting autonomic nervous system, autacoids and respiratory system.		
a3. Describe the role of pharmacist in chemical synthesis of drugs.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment

		Strategies
b1. Interpret the rules of structure-activity relationship to construct pharmacophore of drugs affecting autonomic nervous system, autacoids and respiratory system.	**Active Lecture, feed-back learning**	**Written exams , quizzes**
b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing	**Active Lecture**	**Written exams**
b3. Classify, chemically, the drugs affecting autonomic nervous system, autacoids and respiratory system.		
b4. Compare between chemically related drugs based on their chemical structure		
b5. Design newer drugs affecting autonomic nervous system, autacoids and respiratory system using structure activity relationship rules.	**Group-project**	**Assignments**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**Group-project**	**Assignments**
c4 Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Lab. term works, assignment**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**laboratory practice**	**Lab. term works, final practical exam**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
Part I: Introduction to medicinal chemistry					
1	**Medicinal chemistry roles and concepts**	a1, a2, a3	• definitions, brief history, roles in pharmacy • Basics of combinatorial chemistry and drug design: patent burst, synthesis of fragments, etc. • Pharmacophore and Physicochemical properties in relation to biological activity (structure-activity relationship "SAR").	2	4
2	**Drug-receptor interaction &Stereochemistry of drugs**	a1, a2, a3	• binding and drug-receptor interaction: chemical bonding and biological activity • stereochemical aspects of drug action • isosterism and bioisosterism	2	4
3	**chemistry of Drug metabolism**	a1, a2, a3	• phase I reactions • phase II reactions • Metabolites: inactive, active , more active	2	5
Mid-term exam				1	2
Part II: Chemistry of drugs affecting autonomic systems and skeletal muscles					
4	**Drugs acting on the autonomics nervous system**	a1, a2,a3 , b1, b2, b3, b4	**Physicochemical properties, synthesis, purification, structure-activity relationship, metabolism of drugs acting on sympathetic system**	3	

			• Indirectly sympatholytic drugs • Directly sympatholytic drugs: adrenergic blocking agents • Indirectly sympatholytic drugs • Directly sympatholytic drugs : adrenergic blocking agents		6
		a1, a2,a3 , b1, b2, b3, b4	**Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of drugs acting on parasympathetic system** • Indirectly parasympathomimetics • Direct parasympathomimetics : cholinergic agonists • Indirectly parasympatholytic drugs • Directly sympatholytic drugs: cholinergic blocking agents • **Drugs acting on autonomic ganglia:** Ganglionic stimulants, ganglionic • **Neuromuscular blocking agents**	2	4
5	**Drugs affecting autacoids**	a1, a2,a3 , b1, b2, b3, b4	**Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of drugs acting on parasympathetic system** • Antihistamines • Serotonin agonists and antagonists	3	6
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	5 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: adrenergic agonist : **adrenaline**	**1**	**2**	c1, c2, d1, d2, d3
2.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: adrenergic blockers : **atenolol**	1	2	c1, c2, d1, d2, d3
3.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: Parasympathomimetics : **neostigmine**	1	2	c1, c2, d1, d2, d3
4.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: cholinergic blockers : **atropine**	**1**	**2**	c1, c2, d1, d2, d3
5.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: skeletal muscle relaxants **suxamethonium**	**1**	**2**	c1, c2, d1, d2, d3
6.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: drugs affecting autacoids disorders : **chlorpheniramine.**	**1**	**2**	c1, c2, d1, d2, d3
7.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: drugs serotonin: **ondansetron**	**1**	**2**	c1, c2, d1, d2, d3
8.	Synthesis of drugs	**2**	**4**	c1, c2, d1, d2, d3
9.	Purification of drugs.	**1**	**2**	c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	c1, c2, d1, d2, d3
Total		**11**	**22**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
2	**Group** : each group of students will be assigned to hypothetically design newer drugs form a studied patent drug using SAR principles	b5, c3, c4, d1, d3	8	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1
		Assignments	7, 12	5	5	b5, c3, c4, d1, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2,a3 , b1, b2, b3, b4
3	Final exam (written exam)		16	50	50	a1, a2,a3 , b1, b2, b3, b4
			TOTAL	70	70 %	70

Practical part assessment						
No.	**Assessment Method**		**Week Due**	**Mark**	**Proportion to Total course Assessment**	**Aligned Course Learning Outcomes(CILOs)**
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	c1, c2, d2
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

V Alagarsamy. Textbook of Medicinal Chemistry, volume I & II, 2013, Elsevier

2- Essential References.

Munendra Mohan Varshney & Asif Husain . A textbook of medicinal chemistry. 2015, I.K. International Publishing House Pvt. Limited

3- Electronic Materials and Web Sites *etc*.

1- https://pubs.acs.org/journal/jmcmar
2- https://benthamscience.com/journals/medicinal-chemistry/
3- https://www.slideserve.com/richard_edik/introduction-to-medicinal-chemistry

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**:

	Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism:** Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Course Specification

PHARMACEUTICAL ANALYTICAL CHEMISTRY III

XXVIII. Course Identification and General Information:

24	**Course Title:**	**PHARMACEUTICAL ANALYTICAL CHEMISTRY III**					
24	**Course Code &Number:**	**PHR316**					
24	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
24	**Study level/ semester at which this course is offered:**	*(THIRD) Year – (1ST) semester*					
24	**Pre –requisite (if any):**	• **Pharmaceutical Analytical chemistry II**					
24	**Co –requisite (if any):**	**none**					
24	**Program (s) in which the course is offered:**	**All BC programs offered by the university**					
24	**Language of teaching the course:**	**ENGLISH**					
25	**Location of teaching the course:**	**IN THE UNIVERSITY**					
25	**Prepared By:**						
25	**Date of Approval**						

L: lecturing ; Tut: Tutorial , S: seminar ; P: practical ; Tr.: training

XXIX. Course Description:

The course deals with the study of essential principles, instrumentation and pharmaceutical applications of electrochemical, thermal, particle-size and optical analytical techniques.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

16. Alignment CILOs to PILOs

No.	PILOs	CILOs
1.	A2	**a1.** Explicit the physicochemical properties of matters that are used as basis for qualitative and quantitative instrumental analysis.
2.	A3	**a2**. Discuss the principles, instrumentations and pharmaceutical applications of electrochemical, thermal, particle-size and optical instrumental analytical techniques.
3.		**a3**. Explicit the advantages of instrumental techniques over manual classical techniques.
4.	A4	**a4.** Comprehend his/her role as a pharmacist in providing precise and accurate analytical results based on implementing strict standard operative and analytical procedures.
5.	B1	**b1.** Interpret correctly outcome data of an instrumental analysis.
6.		**b2.** Solve problems related to the studied instrumental analytical techniques including identification and/or quantitation of test samples.
7.	B2	**b3 .**Classify instrumental analytical techniques based on their principles and applications.
8.		**b4.** Compare between various types of instrumental analytical techniques.
9.	B4	**b5.** Assess the accuracy and precision of an instrumental analytical techniques**.**
10.		**b6.** Select the appropriate technique to perform an instrumental quantitative/qualitative analysis.
11.	C1	**c1.**Handleefficiently the tools and chemicals used in pharmaceutical instrumental analysis Lab.
12.		**c2.** Operate successfully the instruments used in pharmaceutical instrumental analysis Lab.
13.	C2	**c3 .** Perform effectively the experiments and practical tasks including qualitative and quantitative analysis of substances in a given sample using standard procedures.
14.	C3	**c4 .**Take the required safety criteria during performing different types of practical and professional pharmacy works.

15.	**C4**	**c5 .**Search efficiently for information using documented and electronic sources of information.
16.		**c6.** Present and report his/her works correctly using appropriate writing rules and technologies media.
17.	**D1**	**d1.** work successfully in team-work.
18.	**D2**	**d2.** Behave in discipline during practicing practical and professional works and assignments
19.	**D3**	**d3.**. Communicate effectively with his/her colleagues.
20.	**D4**	**d4.** Demonstrate time management and self-learning during performing practical and professional works and assignments.

17. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1	**Lecture**	**Written exam , Attendance**
a2, a3	**Lecture**	**Written exam , Attendance**
a4	**Lecture** **laboratory practice**	**Written exam , Attendance** **Practical assessment (Lab. attendance, accomplishment)**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1	**Lecture** **laboratory practice**	**Written exam , Attendance** **Practical assessment (Lab. attendance, accomplishment, oral/written exam , practical exam)**

b2	Lecture laboratory practice Feed-back learning	Written exam , Attendance Practical assessment (Lab. attendance, accomplishment, oral/written exam , practical exam) Assignments , quizzes
b3, b4	Lecture	Written exam , Attendance
b5, b6	Lecture laboratory practice	Written exam , Attendance Practical assessment (Lab. attendance, accomplishment, oral/written exam , practical exam)

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1, c2, c3, c4	laboratory practice	Practical assessment (Lab. attendance, accomplishment, attitude, practical exam)
c5	feed-back learning, Group-project	Assignments
c6	laboratory practice Feed-back learning Group-project	Practical assessment (Lab. attendance, reporting, practical exam) Assignments

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1, d2, d3	laboratory practice Feed-back learning	Practical assessment (Lab. attendance, attitude, practical exam) Assignments
d4	laboratory practice Feed-back learning	Practical assessment (Lab. attendance, accomplishment, practical exam) Assignments

XXIV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Electrochemical analysis**	a1, a2 , a4, b1, b2, b4, b5, b6, d2	• **Electrogravimetric analysis:** Theory of electroanalysis, polarizatuon, decomposition, potential and over voltage electrolytic determination at constant current and with controlled potential at the cathode. • **Conductometry**: experimental details of conductometric titration and applications. • **Potentiometry**: Principles, methods and application. • **Amperometry:** theory and technique of amperometric titration with dropping mercury electrode, high frequency titration, its applications. • **Polarographic analysis**: Introduction, principles, diffusion current and half wave potential, quantitative techniques.	4	8
MID-TERM EXAM				1	2
2	**Thermal analysis**	a1, a2 , a4, b1, b2, b4, b5, b6, d2	• **Thermogravimetry:** principle, instrumentation, temperature, verification, verification of electrobalance, procedures. • **Differential scanning calorimetry (DSC):** principles, instrumentation, calibration of equipments, procedures, phase change, applications, determination of purity • **Melting point tester:**Principle, instrumentation, procedures, applications • **Thermomicroscopy:** principle, apparatus, applications • **Freezing point tester:**Principle, purpose, apparatus • **Determination of Distillation Range :** Principle, purpose, apparatus, procedures, applications	3	6

4	**Particle size and morphology analysis**	a1, a2 , a4, b1, b2, b4, b5, b6, d2	• **Analysis of particle size by laser light diffraction** • Definitions and non-instrumental methods for particle size analysis.laser light diffraction: Principle, apparatus, procedures,measurement of particle size of dispersed samples, conversion of scattering pattern into particle-size distribution • **Determination of particle morphology (crystallinity)** Definition and significance of crystallinity, **X-ray powder diffraction** for determination of crystallinity: Principle, apparatus, procedures , **Other methods:** microcalorimetry, solution calorimetry, thermal analysis	2	4
5	**Optical analysis**	a1, a2 , a4, b1, b2, b4, b5, b6, d2	• **Flow cyometry:** Principle, apparatus, procedures, applications • **Polarimetery: Determination of optical and specific optical rotation:** Principle, purpose, apparatus, procedures**,** • **Determination of refractive index:** Principle, purpose, apparatus, procedures	2	4
Course Review		a1, a2 , a4, b1, b2, b3, b7, , b4, b5, b6, d2	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
113.	introduction to pharmaceutical instrumental analysis Lab.: safety requirements, list of experiments, How to report, etc.	**1**	**2**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
114.	Potentiometric titration of drugs : diclofenac sodium	**1**	**2**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
115.	Potentiometric titration of drugs : dextromethorphan HBr	**1**	**2**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
116.	Polarographic analysis	**1**	**2**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
117.	Melting point analysis	**1**	**2**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
118.	Determination of Distillation Range	**1**	**2**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
119.	Calorimetry of solutions	**1**	**2**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
120.	Polarimetric analysis of specific rotation	**1**	**2**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
121.	Analysis of refractive index	**2**	**4**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
122.	Review	**1**	**2**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
PRACTICAL EXAM		**1**	**2**	
Total		**12**	**24 equivalent to 12 credit hours**	

Number of Weeks	12

XXVI. Teaching strategies of the course:

Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XXVIII. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to solve the problems provided by the teacher at the end of each unit.	b2, c5, c6, d4	4-13	3
2	**Group** : each group of students will be assigned to provide a video of simulation of one of the analytical technique studied. The students of each group must explain the simulation for other students.	c5, c6, d1, d2, d4	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method	Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Attendance	1 - 15	2	2	a1, a2 , a4, b1, b2, b3 b4,b7, b5, b6, d2
2	Assignments (1 + 2)	4-13, 14	5	5	b2, c5, c6, d1, d2, d4
3	Quiz 1 + Quiz 2	7, 12	3	3	b1, b2
4	Mid-semester exam of theoretical part (written exam	7	10	10	a1, a2 , a4, b1, b2, b3 b4,b7, b5, b6, d2
5	Final exam of theoretical part (written exam)	17	40	40	a1, a2 , a4, b1, b2, b3 b4,b7, b5, b6, d2
		TOTAL	60	60 %	60

Practical part assessment

No.	Assessment Method	Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Attendance	Weekly	5	5	a1, a2, , b1, b2, b1, b2, b5, b6, c1, c2, c3, c4, c5, c4, c6, d1, d2, d3, d4
2	Lab. Attitude	weekly	2	2	c4, d1, d2, d3
3	Lab. Accomplishments	weekly	5	5	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d4
4	Lab. Reporting	weekly	3	3	c6
5	Exam of practice theory (written exam or oral exam)	14	5	5	a1, a2, b1, b2, b1, b2, b5, b6
6	Practical exam (practical)	14	20	20	a1, a2, , b1, b2, b1, b2, b5, b6,

					c1, c2, c3, c4, c5, c4, c6, d1, d2, d3, d4
			Total	40	40 %	

XXVII. Learning Resources:

1- Required Textbook(s) (maximum two).

7. David Harvey, modern analytical chemistry, 2000, McGraw-Hill
8. British pharmacopeia 2013

2- Essential References.

1. Hadkar. Instrumental methods in pharmaceutical analysis
2. Purcell. Pharmaceutical analysis

3- Electronic Materials and Web Sites *etc*.

www.en.*wikipedia.org/*

XV. Course Policies:

25.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
26.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
27.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
28.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Course Plan (Syllabus) of
PHARMACEUTICAL ANALYTICAL CHEMISTRY III

II. Course Description:

The course deals with the study of essential principles, instrumentation and pharmaceutical applications of electrochemical, thermal, particle-size and optical analytical techniques.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

No.	PILOs	CILOs
1.	A2	**a1.** Explicit the physicochemical properties of matters that are used as basis for qualitative and quantitative instrumental analysis.
2.	A3	**a2**. Discuss the principles, instrumentations and pharmaceutical applications of electrochemical, thermal, particle-size and optical instrumental analytical techniques.
3.		**a3**. Explicit the advantages of instrumental techniques over manual classical techniques.
4.	A4	**a4.** Comprehend his/her role as a pharmacist in providing precise and accurate analytical results based on implementing strict standard operative and analytical procedures.
5.	B1	**b1.** Interpret correctly outcome data of an instrumental analysis.
6.		**b2.** Solve problems related to the studied instrumental analytical techniques including identification and/or quantitation of test samples.
7.	B2	**b3 .**Classify instrumental analytical techniques based on their principles and applications.
8.		**b4.** Compare between various types of instrumental analytical techniques.
9.	B4	**b5.** Assess the accuracy and precision of an instrumental analytical techniques**.**
10.		**b6.** Select the appropriate technique to perform an instrumental quantitative/qualitative analysis.
11.	C1	**c1.**Handleefficiently the tools and chemicals used in pharmaceutical instrumental analysis Lab.
12.		**c2.** Operate successfully the instruments used in pharmaceutical instrumental analysis Lab.
13.	C2	**c3 .** Perform effectively the experiments and practical tasks including qualitative and quantitative analysis of substances in a given sample using standard procedures.
14.	C3	**c4 .**Take the required safety criteria during performing different types of practical and professional pharmacy works.

15.	C4	**c5 .**Search efficiently for information using documented and electronic sources of information.
16.		**c6.** Present and report his/her works correctly using appropriate writing rules and technologies media.
17.	D1	**d1.** work successfully in team-work.
18.	D2	**d2.** Behave in discipline during practicing practical and professional works and assignments
19.	D3	**d3.**. Communicate effectively with his/her colleagues.
20.	D4	**d4.** Demonstrate time management and self-learning during performing practical and professional works and assignments.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1	Lecture	Written exam , Attendance
a2, a3	Lecture	Written exam , Attendance
a4	Lecture laboratory practice	Written exam , Attendance Practical assessment (Lab. attendance, accomplishment)

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1	Lecture laboratory practice	Written exam , Attendance Practical assessment (Lab. attendance, accomplishment, oral/written exam , practical exam)

b2	Lecture laboratory practice Feed-back learning	Written exam , Attendance Practical assessment (Lab. attendance, accomplishment, oral/written exam , practical exam) Assignments , quizzes
b3, b4	Lecture	Written exam , Attendance
b5, b6	Lecture laboratory practice	Written exam , Attendance Practical assessment (Lab. attendance, accomplishment, oral/written exam , practical exam)

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1, c2, c3, c4	laboratory practice	Practical assessment (Lab. attendance, accomplishment, attitude, practical exam)
c5	feed-back learning, Group-project	Assignments
c6	laboratory practice Feed-back learning Group-project	Practical assessment (Lab. attendance, reporting, practical exam) Assignments

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1, d2, d3	laboratory practice Feed-back learning	Practical assessment (Lab. attendance, attitude, practical exam) Assignments
d4	laboratory practice Feed-back learning	Practical assessment (Lab. attendance, accomplishment, practical exam) Assignments

XXV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Electrochemical analysis**	a1, a2 , a4, b1, b2, b4, b5, b6, d2	• **Electrogravimetric analysis:** Theory of electroanalysis, polarizatuon, decomposition, potential and over voltage electrolytic determination at constant current and with controlled potential at the cathode. • **Conductometry**: experimental details of conductometric titration and applications. • **Potentiometry**: Principles, methods and application. • **Amperometry:** theory and technique of amperometric titration with dropping mercury electrode, high frequency titration, its applications. • **Polarographic analysis**: Introduction, principles, diffusion current and half wave potential, quantitative techniques.	4	8
MID-TERM EXAM				1	2

2	**Thermal analysis**	a1, a2 , a4, b1, b2, b4, b5, b6, d2	• **Thermogravimetry:** principle, instrumentation, temperature, verification, verification of electrobalance, procedures. • **Differential scanning calorimetry (DSC):** principles, instrumentation, calibration of equipments, procedures, phase change, applications, determination of purity • **Melting point tester:**Principle, instrumentation, procedures, applications • **Thermomicroscopy:** principle, apparatus, applications • **Freezing point tester:**Principle, purpose, apparatus • **Determination of Distillation Range :** Principle, purpose, apparatus, procedures, applications	3	6
4	**Particle size and morphology analysis**	a1, a2 , a4, b1, b2, b4, b5, b6, d2	• **Analysis of particle size by laser light diffraction** • Definitions and non-instrumental methods for particle size analysis.laser light diffraction: Principle, apparatus, procedures,measurement of particle size of dispersed samples, conversion of scattering pattern into particle-size distribution • **Determination of particle morphology (crystallinity)** Definition and significance of crystallinity, **X-ray powder diffraction** for determination of crystallinity: Principle, apparatus, procedures , **Other methods:** microcalorimetry, solution calorimetry, thermal analysis	2	4
5	**Optical analysis**	a1, a2 , a4, b1, b2, b4, b5, b6, d2	• **Flow cyometry:** Principle, apparatus, procedures, applications • **Polarimetery: Determination of optical and specific optical rotation:** Principle, purpose, apparatus, procedures**,** • **Determination of refractive index:** Principle, purpose, apparatus, procedures	2	4

Course Review	a1, a2 , a4, b1, b2, b3, b7, , b4, b5, b6, d2	Review of the course topics by discussion session.	1	2
FINAL - EXAM			1	2
TOTAL			16	32
Number of Weeks /and Units Per Semester			16 weeks	Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	**introduction to pharmaceutical instrumental analysis Lab.: safety requirements, list of experiments, How to report, etc.**	**1**	**2**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
2.	**Potentiometric titration of drugs : diclofenac sodium**	**1**	**2**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
3.	**Potentiometric titration of drugs : dextromethorphan HBr**	**1**	**2**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
4.	**Polarographic analysis**	**1**	**2**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
5.	**Melting point analysis**	**1**	**2**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
6.	Determination of Distillation Range	**1**	**2**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
7.	Calorimetry **of solutions**	**1**	**2**	a4, b1, b2, b5, b6, c1,

				c2, c3, c4, c6, d1, d2, d3, d4
8.	**Polarimetric analysis of specific rotation**	**1**	**2**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
9.	**Analysis of refractive index**	**2**	**4**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
10.	**Review**	**1**	**2**	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d1, d2, d3, d4
PRACTICAL EXAM		**1**	**2**	
Total		**12**	**24 equivalent to 12 credit hours**	
Number of Weeks			**12**	

XXVII. Teaching strategies of the course:

Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XXIX. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to solve the problems provided by the teacher at the end of each unit.	b2, c5, c6, d4	4-13	3
2	**Group** : each group of students will be assigned to provide a video of simulation of one of the analytical technique studied. The students of each group must explain the simulation for other students.	c5, c6, d1, d2, d4	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method	Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Attendance	1 - 15	2	2	a1, a2 , a4, b1, b2, b3 b4,b7, b5, b6, d2
2	Assignments (1 + 2)	4-13, 14	5	5	b2, c5, c6, d1, d2, d4
3	Quiz 1 + Quiz 2	7, 12	3	3	b1, b2
4	Mid-semester exam of theoretical part (written exam	7	10	10	a1, a2 , a4, b1, b2, b3 b4,b7, b5, b6, d2
5	Final exam of theoretical part (written exam)	17	40	40	a1, a2 , a4, b1, b2, b3 b4,b7, b5, b6, d2
		TOTAL	60	60 %	60

Practical part assessment					
No.	**Assessment Method**	**Week Due**	**Mark**	**Proportion of Total course Assessment**	**Aligned Course Learning Outcomes(CILOs)**
1	Lab. Attendance	Weekly	5	5	a1, a2, , b1, b2, b1, b2, b5, b6, c1, c2, c3, c4, c5, c4, c6, d1, d2, d3, d4
2	Lab. Attitude	weekly	2	2	c4, d1, d2, d3
3	Lab. Accomplishments	weekly	5	5	a4, b1, b2, b5, b6, c1, c2, c3, c4, c6, d4
4	Lab. Reporting	weekly	3	3	c6
5	Exam of practice theory (written exam or oral exam)	14	5	5	a1, a2, b1, b2, b1, b2, b5, b6
6	Practical exam (practical)	14	20	20	a1, a2, , b1, b2, b1, b2, b5, b6, c1, c2, c3, c4, c5, c4, c6, d1, d2, d3, d4
		Total	40	40 %	

XXVIII. Learning Resources:

1- Required Textbook(s) (maximum two).

9. David Harvey, modern analytical chemistry, 2000, McGraw-Hill
10. British pharmacopeia 2013

2- Essential References.

3. Hadkar. Instrumental methods in pharmaceutical analysis
4. Purcell. Pharmaceutical analysis

3- Electronic Materials and Web Sites *etc*.

www.en.*wikipedia.org/*

XVI. Course Policies:	
29.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
30.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
31.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
32.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

Pharmaceutical Organic Chemistry III

Course Code (**PHR315**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XXX. Course Identification and General Information:

25	**Course Title:**	**Pharmaceutical Organic Chemistry III**			
25	**Course Code &Number:**	**PHR315**			
25	**Credit hours:**	C.H			TOTAL
		L.	P.	T.	
		2	1	-	**3**
25	**Study level/ semester at which this course is offered:**	*(3RD) Year – (First) semester*			
25	**Pre –requisite (if any):**	**PHR225 (Phar. Organic Chemistry II)**			
25	**Co –requisite (if any):**	**Nil**			
25	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
26	**Language of teaching the course:**	**ENGLISH**			

26	**Location of teaching the course:**	**At the university facility**
26	**Prepared by**	
26	**Date of Approval**	

L: lecturing ; P: practical ; T.: training

XXXI. Course Description:

The course is the third and last one among courses of (Phar. Organic chemistry) which all provide the student with knowledge and skills of organic chemistry. This course focuses on the functional chemical groups, chemical composition, physical and chemical properties, synthesis, reactions of complicated organic compounds (monocyclic, polycyclic, homocyclic and heterocyclic). The practical part also provides the student with the skills necessary to deal with these compounds and perform tests to identify their reactions in the chemistry lab.

هذا المقرر هو الثالث والأخير من بين مقررات (الكيمياء العضوية الصيدلانية) التي تزود جميعها الطالب بالمعرفة والمهارات في كيمياء المركبات العضوية. يركز هذا المقرر الدراسي على للمركبات العضوية المعقدة (أحادية الحلقة، متعددة الحلقات، متجانسة الحلقية وغير متجانسة) من حيث مجموعاتها الكيميائية الوظيفية، وتركيبها الكيميائي، لخصائصها الفيزيائية والكيميائية، وتفاعلاتها الكيميائية وطرق تخليقها كيميائيا كما يزود الجانب العملي الطالب بالمهارات اللازمة للتعامل مع هذه المركبات وإجراء الاختبارات للتعرف على تلك المركبات وتفاعلاتها في معمل الكيمياء.

V. Intended learning outcomes of the course: (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

5. Alignment CILOs to PILOs

PILOs		**Intended learning outcomes of the course (CILOs)**
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Discuss the physicochemical properties of monocyclic, polycyclic, homocyclic and heterocyclic organic compounds..
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Differentiate, name and draw the chemical structure of monocyclic, polycyclic, homocyclic and heterocyclic compounds. organic compounds.
		b2. Relate structures of monocyclic, polycyclic, homocyclic and heterocyclic compounds to their physical and chemical properties. .
		b3. Predict the outcomes of a reaction of

		monocyclic, polycyclic, homocyclic and heterocyclic compounds. organic compound and other chemicals.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b4.** Design a sequence to synthesize monocyclic, polycyclic, homocyclic and heterocyclic organic compounds from a parent compound.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

6. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Discuss the physicochemical properties of monocyclic, polycyclic, homocyclic and heterocyclic organic compounds.	**Active Lecture**	**Written exams**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Differentiate, name and draw the chemical structure of organic compounds.	**Active Lecture ,laboratory practice, Feed-back learning**	**Written exams, quizzes, lab. term work, practical final exam**
b4. Design a sequence to synthesize an organic compound from a parent compound.		
b2. Relate functional group in organic compounds to the physical and chemical properties of the compounds.	**Lecture-discussion Feed-back learning**	**Written exams, quizzes**
b3. Predict the catalysts required and the outcomes of a reaction between an organic compound and other chemicals.		

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c4. Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Lab. practice, group-project, feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**

XXVI. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Monocyclic Alicyclic compounds**	a1, b1, b2, b3, b4	Classification, physicochemical properties, preparation, reactions, examples of drugs and their medical uses.	1	2
2	**Benzyl and Benzhydryl derivatives**	a1, b1, b2, b3, b4	Classification, physicochemical properties, preparation, reactions, examples of drugs and their medical uses.	1	2
3	**Phenethyl and Phenylpropylamines**	a1, b1, b2, b3, b4	Classification, physicochemical properties, preparation, reactions, examples of drugs and their medical uses.	2	4
4	**Arylacetic and Arylpropionic Acids**	a1, b1, b2, b3, b4	Classification, physicochemical properties, preparation, reactions, examples of drugs and their medical uses.	2	4
MID-TERM EXAM				1	2
5	**Arylethylenes compounds**	a1, b1, b2, b3, b4	Classification, physicochemical properties, preparation, reactions, examples of drugs and their medical uses.	1	2

6	**Polycyclic Aromatic compounds**	a1, b1, b2, b3, b4	Classification, physicochemical properties, preparation, reactions, examples of drugs and their medical uses.	2	2
7	**Steroids**	a1, b1, b2, b3, b4	Classification, physicochemical properties, preparation, reactions, examples of drugs and their medical uses.	1	2
8	**Heterocyclic compounds: 5, 6, 7 – membered fused to one ring and two rings**	a1, b1, b2, b3, b4	Classification, physicochemical properties, preparation, reactions, examples of drugs and their medical uses.	3	6
Course Review		a1, b1, b2, b3, b4	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	8 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
General physicochemical properties of the chemical group. experiments of Chemical identification and synthesis of one-two drugs belonging to the following groups				
123.	Monocyclic Alicyclic compounds e.g. Hyoscine	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
124.	Benzyl and Benzhydryl derivatives e.g. Orphenadine	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
125.	Phenethyl and Phenylpropylamines e.g. adrenaline	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
126.	Phenethyl and Phenylpropylamines e.g. methyldopa	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
127.	Arylacetic and Arylpropionic Acids e.g. Thyroxin	**2**	**4**	b1, b4, c1, c2, d1, d2, d3
128.	Polycyclic Aromatic compounds e.g. Tetracycline	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
129.	Heterocyclic compounds e.g. Mebendazole	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
130.	Heterocyclic compounds e.g. indomethacin	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
131.	Heterocyclic compounds e.g. aminophylline	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
132.	Heterocyclic compounds e.g. ascorbic acid	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b1, b4, c1, c2, d1, d2, d3
Total		**12**	**24 equivalent to 12 credit hours**	
Number of Weeks			**12**	

XVIII. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XXX. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: the teacher provide the students with chemical problems related to the studied topics. Every student is assigned to solve some of those problems individually.	d1, d2, c3, c4	7	
2	**Group:** each group of students will be assigned to do a search-report supported by illustrating figures for all drugs belonging to one of the studied homocyclic/hetrocyclic organic compounds.	d1, d2, d3, c3, c4	12	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4
		Assignments	7, 12	5	5	d1, d2, d3, c3, c4
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, b1, b2, b3, b4
3	Final exam of theoretical part (written exam)		16	50	50	a1, b1, b2, b3, b4
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3, b1, b4
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	c1, c2, d2, b1, b4
			Total	30	30 %	

XXIX. Learning Resources:

1- Required Textbook(s) (maximum two).

11. Daniel Ledincer : Organic chemistry of drug synthesis, Vol. 7, 2007, John Wiley & Sons

2- Essential References.

1. John A. Joule and Keith Mills Heterocyclic Chemistry. 2013, John Wiley & Sons
1. United states pharmacopeia USP, 2018

3- Electronic Materials and Web Sites *etc*.

1. https://uomustansiriyah.edu.iq/media/lectures/4/4_2017_09_29!08_20_51_PM.ppt
2. http://www.chem.gla.ac.uk/staff/stephenc/teaching/HeterocycleLectures2011_2C12.pdf

XVII. Course Policies:

33.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
34.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
35.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
36.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

Pharmaceutical Organic Chemistry III

I. Course Identification and General Information:

1.	Course Title:	Pharmaceutical Organic Chemistry III			
2.	Course Code &Number:	PHR315			
3.	Credit hours:	C.H			TOTAL
		L.	P.	T.	
		2	1	-	3
4.	Study level/ semester at which this course is offered:	*(3RD) Year – (First) semester*			
5.	Pre –requisite (if any):	PHR225 (Phar. Organic Chemistry II)			
6.	Co –requisite (if any):	Nil			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	At the university facility			
10	Prepared by				
11	Date of Approval				

II. Course Description:

The course is the third and last one among courses of (Phar. Organic chemistry) which all provide the student with knowledge and skills of organic chemistry. This course focuses on the functional chemical groups, chemical composition, physical and chemical properties, synthesis, reactions of complicated organic compounds (monocyclic, polycyclic, homocyclic and heterocyclic). The practical part also provides the student with the skills necessary to deal with these compounds and perform tests to identify their reactions in the chemistry lab.

هذا المقرر هو الثالث والأخير من بين مقررات (الكيمياء العضوية الصيدلانية) التي تزود جميعها الطالب بالمعرفة والمهارات في كيمياء المركبات العضوية. يركز هذا المقرر الدراسي على للمركبات العضوية المعقدة (أحادية الحلقة، متعددة الحلقات، متجانسة الحلقية وغير متجانسة) من حيث مجموعاتها الكيميائية الوظيفية، وتركيبها الكيميائي، لخصائصها الفيزيائية والكيميائية، وتفاعلاتها الكيميائية وطرق تخليقها كيميائيا كما يزود الجانب العملي الطالب بالمهارات اللازمة للتعامل مع هذه المركبات وإجراء الاختبارات للتعرف على تلك المركبات وتفاعلاتها في معمل الكيمياء.

III. Intended learning outcomes of the course: (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		Intended learning outcomes of the course (CILOs)
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Discuss the physicochemical properties of monocyclic, polycyclic, homocyclic and heterocyclic organic compounds..
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Differentiate, name and draw the chemical structure of monocyclic, polycyclic, homocyclic and heterocyclic compounds. organic compounds.
		b2. Relate structures of monocyclic, polycyclic, homocyclic and heterocyclic compounds to their physical and chemical properties. .
		b3. Predict the outcomes of a reaction of monocyclic, polycyclic, homocyclic and heterocyclic compounds. organic compound and other chemicals.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b4.** Design a sequence to synthesize monocyclic, polycyclic, homocyclic and heterocyclic organic compounds from a parent compound.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4. Present and report his/her works correctly

		using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Discuss the physicochemical properties of monocyclic, polycyclic, homocyclic and heterocyclic organic compounds.	**Active Lecture**	**Written exams**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Differentiate, name and draw the chemical structure of organic compounds.	**Active Lecture ,laboratory practice, Feed-back learning**	**Written exams, quizzes, lab. term work, practical final exam**
b4. Design a sequence to synthesize an organic compound from a parent compound.		
b2. Relate functional group in organic compounds to the physical and chemical properties of the compounds.	**Lecture-discussion Feed-back learning**	**Written exams, quizzes**
b3. Predict the catalysts required and the outcomes of a reaction between an organic compound and other chemicals.		

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c4. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Lab. practice, group-project, feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Monocyclic Alicyclic compounds**	a1, b1, b2, b3, b4	Classification, physicochemical properties, preparation, reactions, examples of drugs and their medical uses.	1	2
2	**Benzyl and Benzhydryl derivatives**	a1, b1, b2, b3, b4	Classification, physicochemical properties, preparation, reactions, examples of drugs and their medical uses.	1	2
3	**Phenethyl and Phenylpropylamines**	a1, b1, b2, b3, b4	Classification, physicochemical properties, preparation, reactions, examples of drugs and their medical uses.	2	4
4	**Arylacetic and Arylpropionic Acids**	a1, b1, b2, b3, b4	Classification, physicochemical properties, preparation, reactions, examples of drugs and their medical uses.	2	4
MID-TERM EXAM				1	2
5	**Arylethylenes compounds**	a1, b1, b2, b3, b4	Classification, physicochemical properties, preparation, reactions, examples of drugs and their medical uses.	1	2
6	**Polycyclic Aromatic compounds**	a1, b1, b2, b3, b4	Classification, physicochemical properties, preparation, reactions, examples of drugs and their medical uses.	2	2
7	**Steroids**	a1, b1, b2, b3, b4	Classification, physicochemical properties, preparation, reactions, examples of drugs and their medical uses.	1	2
8	**Heterocyclic compounds: 5, 6, 7 – membered fused to**	a1, b1, b2, b3, b4	Classification, physicochemical properties, preparation, reactions, examples of drugs and their medical uses.	3	6

	one ring and two rings				
Course Review		a1, b1, b2, b3, b4	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	8 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
General physicochemical properties of the chemical group. experiments of Chemical identification and synthesis of one-two drugs belonging to the following groups				
1.	Monocyclic Alicyclic compounds e.g. Hyoscine	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
2.	Benzyl and Benzhydryl derivatives e.g. Orphenadine	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
3.	Phenethyl and Phenylpropylamines e.g. adrenaline	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
4.	Phenethyl and Phenylpropylamines e.g. methyldopa	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
5.	Arylacetic and Arylpropionic Acids e.g. Thyroxin	**2**	**4**	b1, b4, c1, c2, d1, d2, d3
6.	Polycyclic Aromatic compounds e.g. Tetracycline	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
7.	Heterocyclic compounds e.g. Mebendazole	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
8.	Heterocyclic compounds e.g. indomethacin	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
9.	Heterocyclic compounds e.g. aminophylline	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
10.	Heterocyclic compounds e.g. ascorbic acid	**1**	**2**	b1, b4, c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b1, b4, c1, c2, d1, d2, d3
Total		**12**	**24 equivalent to 12 credit hours**	
Number of Weeks			**12**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: the teacher provide the students with chemical problems related to the studied topics. Every student is assigned to solve some of those problems individually.	d1, d2, c3, c4	7	
2	**Group:** each group of students will be assigned to do a search-report supported by illustrating figures for all drugs belonging to one of the studied homocyclic/hetrocyclic organic compounds.	d1, d2, d3, c3, c4	12	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3, b4
		Assignments	7, 12	5	5	d1, d2, d3, c3, c4
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, b1, b2, b3, b4
3	Final exam of theoretical part (written exam)		16	50	50	a1, b1, b2, b3, b4
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3, b1, b4
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	c1, c2, d2, b1, b4
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

12. Daniel Ledincer : Organic chemistry of drug synthesis, Vol. 7, 2007, John Wiley & Sons

2- Essential References.

1. John A. Joule and Keith Mills Heterocyclic Chemistry. 2013, John Wiley & Sons
2. United states pharmacopeia USP, 2018

3- Electronic Materials and Web Sites *etc*.

1. https://uomustansiriyah.edu.iq/media/lectures/4/4_2017_09_29!08_20_51_PM.ppt
2. http://www.chem.gla.ac.uk/staff/stephenc/teaching/HeterocycleLectures2011_2C12.pdf

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

Pharmaceutical Microbiology I

Course Code (**PHR312**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XXXII. Course Identification and General Information:

26	**Course Title:**	**PHARMACEUTICAL MICROBILOGY I**					
26	**Course Code:**	**PHR312**					
26	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
26	**Study level/ semester at which this course is offered:**	*(THIRD) Year – (1st) semester*					
26	**Pre –requisite (if any):**						
26	**Co –requisite (if any):**	**none**					
27	**Program (s) in which the course is offered:**	**All BC programs offered by the university**					
27	**Language of teaching the course:**	**ENGLISH**					
27	**Location of teaching the course:**	**IN THE UNIVERSITY**					
27	**Prepared by**						
27	**Date of Approval**						

L: lecturing ; Tut: Tutorial , S: seminar ; P: practical ; Tr.: training

XXXIII. Course Description:

The course is designed to provide the students with knowledge related to applications of microbiology in pharmaceutical industry and research including sterilization, preservation, study of microbial content, and antimicrobial activity of drugs, products and extracts. The practical part of the course will provide the student skills to perform such missions in the microbiology Lab.

تم تصميم هذا المقرر لتزويد الطلاب بالمعرفة المتعلقة بتطبيقات علم الأحياء الدقيقة في صناعة الأدوية والأبحاث الصيدلانية بما في ذلك التعقيم والحفظ ودراسة المحتوى الميكروبي وتطبيقات دراسة فعالية المضادات الحيوية والمنتجات الأخرى والمستخلصات الطبيعية ضد الميكروبات، وسيوفر الجزء العملي من المقرر لطالب المهارات المعملية تلك المهام في مختبر علم الأحياء الدقيقة.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

18. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Identify of the microbes commonly resistant to antimicrobials.
		a2. Describe the biological characters and mechanism of microbial resistance
A4	Describe analytical methods, principles, design and development techniques	**a3**. Discuss the principles and technologies applied in pharmacy for microbial investigations, product preservation, sterilization and assessment of antimicrobial activity.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the pharmacist role in applying microbiology knowledge and skills in pharmacy.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the data of inhibition zone obtained from antimicrobial activity test.
		b2. Differentiate between resistant and susceptible microbes
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3 .**Classify preservatives.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b4.** Select standard operation procedures to test microbial content and antimicrobial activity.

Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials , human biological samples, microbial samples and tools used in the laboratory
		c2. Operate the instruments and perform experiments successfully in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c3 .**Search efficiently for information using documented and electronic sources of information.
C3	Conduct research and utilize the results in different pharmaceutical fields.	**c4.** Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

19. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify of the microbes commonly resistant to antimicrobials.	**Active Lecture**	**Written exams**
a2. Describe the biological characters and mechanism of microbial resistance		
a3. Discuss the principles and technologies applied in pharmacy for microbial investigations, product preservation, sterilization and assessment of antimicrobial activity.		
a4. Describe the pharmacist role in applying microbiology knowledge and skills in pharmacy.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret the data of inhibition zone obtained from antimicrobial activity test.	**laboratory practice**	**lab. term work, practical final exam**
b2. Differentiate between resistant and susceptible microbes		
b3 . Classify preservatives.	**Lecture, feed-back learning**	**Written exams, quizzes**
b4. Select standard operation procedures to test microbial content and antimicrobial activity.	**Lecture, lab. practice**	**Written exams, lab. term work, practical final exam**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials , human biological samples, microbial samples and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		

c3 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c4. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Lab. term works, final practical exam, Assignments**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Lab. practice, group-project, feed-back learning**	**Lab. term works, final practical exam, Assignments**

XXVII. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Microbiology relation to pharmacy**	a1, a2, a3, a4, b1, b2, b3, b4, b5, b6 , d2	• Missions of Microbiology lab. as a part of quality control in drug factories • Research : Types of microbiological investigations in relation to pharmaceutical studies (e.g. antimicrobial activity)	1	2
2	**Microbial content**	a1, a2, a3, a4, b1, b2, b3, b4, b5, b6 , d2	• Methods of bacterial investigations counting in a sample of : raw material, air and environment and pharmaceutical product.	2	4
3	**Measurement of antimicrobial activity**	a1, a2, a3, a4, b1, b2, b3, b4, b5, b6 , d2	• Factors to be controlled in the measurement of antimicrobial activity: origin of organism, composition and pH of culture media, exposure and incubation conditions, inoculum concentration and physiological state • Antibiotic biological assay techniques: agar diffusion, disc diffusion , well method, etc.; common control antibiotics for different bacteria and fungi; measurement of inhibition zone, MIC	3	6
Mid-term exam				1	2
4	**Microbiological quality of pharmaceutical materials.**	a1, a2, a3, a4, b1, b2, b3, b4, b5, b6 , d2	➢ Pharmacopeial specifications and tests of **Non-sterile products** o Environmental monitoring o Detection of specific hazardous organisms ➢ Pharmacopeial specifications and tests of **sterile products** o Sterilization methods o Sterility tests	4	8

5	**Preservation Of pharmaceutical products**	a1, a2, a3, a4, b1, b2, b3, b4, b5, b6, d2	• Preservative: definition, classification; common concentration used • Preservative efficacy test: choice of organism and inoculum; reason that deactivate preservatives	2	4
6	**Evaluation of disinfectant**	a1, a2, a3, a4, b1, b2, b3, b4, b5, b6, d2	• Common types of disinfectant and their activity against microbes • Testing of disinfectant efficacy	1	2
7	**Microbial resistance**		• Biological and other reasons of microbial resistance to antimicrobial • Common examples of microbial resistance • General measure to reduce microbial resistance	1	2
Course Review		a1, a2, a3, a4, b1, b2, b3, b4, b5, b6, d2	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
133.	Preparation of a sample and inoculum for investigation of microbial content of staphylococcus aureus. Samples are (1. raw pharmaceutical material e.g. vitamin c) , 2. air sample	**2**	**4**	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
134.	Preparation of a sample and inoculum for investigation of microbial content of E.coli Samples is Sterile product: Voltaren ampoule	**1**		b1, b2,b4, ,c1, c2, c4, d1, d2, d3
135.	Antimicrobial activity test test against any available bacteria Test : standard antibiotic vs. ceftriaxone 1 g vial (Disc method)	**1**	**2**	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
136.	Antimicrobial activity test against any available bacteria test: standard antibiotic vs. tetracycline ointment(Well method)	**1**	**2**	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
137.	Antimicrobial activity test : standard vs. procaine penicillin vial powder (dilution method)	**1**	**2**	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
138.	Determination of MIC of antimicrobial	**1**	**2**	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
139.	Preservative (e.g. benzoic acid) efficacy test	**1**	**2**	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
140.	Review	**1**	**2**	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
Total		**10**	**20**	

XXIX. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VIII. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to do a search report on the pharmacopeial specification of microbial content and sensitivity inhibition zone of one of the studied microbial pathogen.	c3, c4, d2	4-13	3
2	**Group** : each group of students will be assigned to provide a search-based report on natural substances (e.g. plant, minerals) that have antimicrobial activity against one of the studied microbial pathogen.	c3, c4, d1, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b3
		Assignments	7, 12	5	5	c3, c4, d1, d2, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2, a3, a4, b3, b4
3	Final exam (written exam)		16	50	50	a1, a2, a3, a4, b3, b4
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
			Total	30	30 %	

XXX. Learning Resources:

1- Required Textbook(s) (maximum two).

Tim Sandle. Pharmaceutical Microbiology. Essentials for Quality Assurance and Quality Control, 2015, Elsevier

2- Essential References.

1. W. B. Hugo: pharmaceutical microbiology, 2012, Black well science LTD.

3- Electronic Materials and Web Sites *etc*.

https://www.slideshare.net/SonamkzBhutia/introduction-of-pharmaceutical-microbiology

XVIII. Course Policies:

37.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
38.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
39.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
40.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of **Pharmaceutical Microbiology I**

I. Course Identification and General Information:

1.	**Course Title:**	**PHARMACEUTICAL MICROBILOGY I**					
2.	**Course Code:**	**PHR312**					
3.	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
4.	**Study level/ semester at which this course is offered:**	*(THIRD) Year – (1st) semester*					
5.	**Pre –requisite (if any):**						
6.	**Co –requisite (if any):**	**none**					
7.	**Program (s) in which the course is offered:**	**All BC programs offered by the university**					
8.	**Language of teaching the course:**	**ENGLISH**					
9.	**Location of teaching the course:**	**IN THE UNIVERSITY**					
10	**Prepared by**						
11	**Date of Approval**						

II. Course Description:

The course is designed to provide the students with knowledge related to applications of microbiology in pharmaceutical industry and research including sterilization, preservation, study of microbial content, and antimicrobial activity of drugs, products and extracts. The practical part of the course will provide the student skills to perform such missions in the microbiology Lab.

تم تصميم هذا المقرر لتزويد الطلاب بالمعرفة المتعلقة بتطبيقات علم الأحياء الدقيقة في صناعة الأدوية و الأبحاث الصيدلانية بما في ذلك التعقيم والحفظ ودراسة المحتوى الميكروبي و تطبيقات دراسة فعالية المضادات الحيوية والمنتجات الأخرى والمستخلصات الطبيعية ضد الميكروبات, و سيوفر الجزء العملي من المقرر لطالب المهارات المعملية تلك المهام في مختبر علم الأحياء الدقيقة.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Identify of the microbes commonly resistant to antimicrobials.
		a2. Describe the biological characters and mechanism of microbial resistance
A4	Describe analytical methods, principles, design and development techniques	**a3**. Discuss the principles and technologies applied in pharmacy for microbial investigations, product preservation, sterilization and assessment of antimicrobial activity.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the pharmacist role in applying microbiology knowledge and skills in pharmacy.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the data of inhibition zone obtained from antimicrobial activity test.
		b2. Differentiate between resistant and susceptible microbes
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3 .**Classify preservatives.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b4.** Select standard operation procedures to test microbial content and antimicrobial activity.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials , human biological samples, microbial samples and tools used in the laboratory
		c2. Operate the instruments and perform experiments successfully in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation,	**c3 .**Search efficiently for information using documented and electronic sources of

	formulation and analysis of materials according to standard guidelines.	information.
C3	Conduct research and utilize the results in different pharmaceutical fields.	**c4.** Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify of the microbes commonly resistant to antimicrobials.	**Active Lecture**	**Written exams**
a2. Describe the biological characters and mechanism of microbial resistance		
a3. Discuss the principles and technologies applied in pharmacy for microbial investigations, product preservation, sterilization and assessment of antimicrobial activity.		
a4. Describe the pharmacist role in applying microbiology knowledge and skills in pharmacy.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret the data of inhibition zone	**laboratory practice**	**lab. term work, practical final**

obtained from antimicrobial activity test.		**exam**
b2. Differentiate between resistant and susceptible microbes		
b3 . Classify preservatives.	**Lecture, feed-back learning**	**Written exams, quizzes**
b4. Select standard operation procedures to test microbial content and antimicrobial activity.	**Lecture, lab. practice**	**Written exams, lab. term work, practical final exam**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials , human biological samples, microbial samples and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c4. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Lab. term works, final practical exam, Assignments**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Lab. practice, group-project, feed-back learning**	**Lab. term works, final practical exam, Assignments**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Microbiology relation to pharmacy**	a1, a2, a3, a4, b1, b2, b3, b4, b5, b6 , d2	• Missions of Microbiology lab. as a part of quality control in drug factories • Research : Types of microbiological investigations in relation to pharmaceutical studies (e.g. antimicrobial activity)	1	2
2	**Microbial content**	a1, a2, a3, a4, b1, b2, b3, b4, b5, b6 , d2	• Methods of bacterial investigations counting in a sample of: raw material, air and environment and pharmaceutical product.	2	4
3	**Measurement of antimicrobial activity**	a1, a2, a3, a4, b1, b2, b3, b4, b5, b6 , d2	• Factors to be controlled in the measurement of antimicrobial activity: origin of organism, composition and pH of culture media, exposure and incubation conditions, inoculum concentration and physiological state • Antibiotic biological assay techniques: agar diffusion, disc diffusion , well method, etc.; common control antibiotics for different bacteria and fungi; measurement of inhibition zone, MIC	3	6
Mid-term exam				1	2
4	**Microbiological quality of pharmaceutical materials.**	a1, a2, a3, a4, b1, b2, b3, b4, b5, b6 , d2	➢ Pharmacopeial specifications and tests of **Non-sterile products** o Environmental monitoring o Detection of specific hazardous organisms ➢ Pharmacopeial specifications and tests of **sterile products** o Sterilization methods o Sterility tests	4	8

5	**Preservation Of pharmaceutical products**	a1, a2, a3, a4, b1, b2, b3, b4, b5, b6, d2	• Preservative: definition, classification; common concentration used • Preservative efficacy test: choice of organism and inoculum; reason that deactivate preservatives	2	4
6	**Evaluation of disinfectant**	a1, a2, a3, a4, b1, b2, b3, b4, b5, b6, d2	• Common types of disinfectant and their activity against microbes • Testing of disinfectant efficacy	1	2
7	**Microbial resistance**		• Biological and other reasons of microbial resistance to antimicrobial • Common examples of microbial resistance • General measure to reduce microbial resistance	1	2
Course Review		a1, a2, a3, a4, b1, b2, b3, b4, b5, b6, d2	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	Preparation of a sample and inoculum for investigation of microbial content of staphylococcus aureus. Samples are (1. raw pharmaceutical material e.g. vitamin c) , 2. air sample	**2**	**4**	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
2.	Preparation of a sample and inoculum for investigation of microbial content of E.coli Samples is Sterile product: Voltaren ampoule	**1**		b1, b2,b4, ,c1, c2, c4, d1, d2, d3
3.	Antimicrobial activity test test against any available bacteria Test : standard antibiotic vs. ceftriaxone 1 g vial (Disc method)	**1**	**2**	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
4.	Antimicrobial activity test against any available bacteria test: standard antibiotic vs. tetracycline ointment(Well method)	**1**	**2**	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
5.	Antimicrobial activity test : standard vs. procaine penicillin vial powder (dilution method)	**1**	**2**	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
6.	Determination of MIC of antimicrobial	**1**	**2**	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
7.	Preservative (e.g. benzoic acid) efficacy test	**1**	**2**	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
8.	Review	**1**	**2**	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
Total		**10**	**20**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

IX. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to do a search report on the pharmacopeial specification of microbial content and sensitivity inhibition zone of one of the studied microbial pathogen.	c3, c4, d2	4-13	3
2	**Group** : each group of students will be assigned to provide a search-based report on natural substances (e.g. plant, minerals) that have antimicrobial activity against one of the studied microbial pathogen.	c3, c4, d1, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b3
		Assignments	7, 12	5	5	c3, c4, d1, d2, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2, a3, a4, b3, b4
3	Final exam (written exam)		16	50	50	a1, a2, a3, a4, b3, b4
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	b1, b2,b4, ,c1, c2, c4, d1, d2, d3
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).
Tim Sandle. Pharmaceutical Microbiology. Essentials for Quality Assurance and Quality Control, 2015, Elsevier
2- Essential References.
W. B. Hugo: pharmaceutical microbiology, 2012, Black well science LTD.
3- Electronic Materials and Web Sites *etc*.
https://www.slideshare.net/SonamkzBhutia/introduction-of-pharmaceutical-microbiology

XIX. Course Policies:

41.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
42.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
43.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
44.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PHARMACEUTICS II

Course code (**PHR317**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XXXIV. Course Identification and General Information:

27	**Course Title:**	**PHARMACEUTICS II**			
27	**Course Code &Number:**	**PHR317**			
27	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	**3**
27	**Study level/ semester at which this course is offered:**	*(Third) Year – (First) semester*			
27	**Pre –requisite (if any):**	**PHR227 (Pharmaceutics I)**			
28	**Co –requisite (if any):**	**None**			
28	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
28	**Language of teaching the course:**	**ENGLISH**			
28	**Location of teaching the course:**	**at the university facility**			
28	**Prepared by**	.			
28	**Date of Approval**				

L: lecturing; P: practical ; T.: training

XXXV. Course Description:

This course is the second part of "Pharmaceutics "courses that are intended to provide the student with knowledge in preformulation, formulation and preparation of pharmaceutical dosage forms. The course deals with designing of compressed gases (pharmaceutical aerosols), semisolid dosage forms (ointments, creams, pastes and gels) and suppositories. The practical part provides the student with skills to prepare those dosage forms in Pharmaceutics Lab.

هذا المقرر هو الجزء الثاني من مقررات "الصيدلانيات" التي تهدف إلى تزويد الطالب بالمعرفة في دراسات م اقبل الصياغة وصياغة وتحضير الأشكال الدوائية و يركز المقرر على الأشكال الغازية المضغوطة و الأشكال شبه الصلبة (المراهم والكريمات والمعاجين و الجل) و كذلك التحاميل, و يوفر الجزء العملي للطالب المهارات اللازمة لإعداد تلك الأشكال الصيدلانية في مختبر الصيدلانيات.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

20. Alignment CILOs to PILOs

PILOs		CILOs
A4	Describe analytical methods, principles, design and development techniques	**a1.** Describe the significance of pharmaceutics as art and science of dosage form design
		a2. Explicit the types and roles of excipients included in aerosols, semisolid preparations and suppositories.
		a3. Describe the stages of designing pharmaceutical aerosols, semisolid preparations and suppositories.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the role of pharmacist in formulation of pharmaceutical aerosols, semisolid preparations and suppositories.
A11	Identify the properties of dosage forms and novel drug delivery systems.	**a5.** Explicit the general properties, advantages and disadvantages of pharmaceutical aerosols, semisolid preparations and suppositories.
		a6. Discuss the principles, pharmacopeial requirements, methods of preparation, of various types of pharmaceutical aerosols, semisolid preparations and suppositories.
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify pharmaceutical aerosols, semisolid preparations and suppositories.
		b2. Compare between various types of pharmaceutical aerosols, semisolid preparations and suppositories.
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b3.** Design pharmaceutical aerosols, semisolid preparations and suppositories.
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C5	Employ the relevant ways to produce	**c3.** Employ the relevant way to prepare

	extemporaneous preparations including TPN and IV admixtures.	extemporaneous semisolid preparations and suppositories.
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c4 .**Search efficiently for information using documented and electronic sources of information.
		c5 Present and report his/her works correctly using appropriate writing rules and technologies media.
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals	**d3.** Participate efficiently with colleagues in a team work.

21. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Describe the significance of pharmaceutics as art and science of dosage form design	**Active Lecture**	**Written exams**
a2. Explicit the types and roles of excipients included in aerosols, semisolid preparations and suppositories.		
a3. Describe the stages of designing pharmaceutical aerosols, semisolid preparations and suppositories.		
a4. Describe the role of pharmacist in formulation of pharmaceutical aerosols, semisolid preparations and suppositories.		
a5. Explicit the general properties, advantages and disadvantages of pharmaceutical aerosols, semisolid preparations and suppositories.		
a6. Discuss the principles, pharmacopeial requirements, methods of preparation, of various types of pharmaceutical aerosols, semisolid preparations and suppositories.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 . Classify pharmaceutical aerosols, semisolid preparations and suppositories.	**Active Lecture , Feed-back learning**	**Written exams, quizzes**
b2. Compare between various types of pharmaceutical aerosols, semisolid preparations and suppositories.		
b3. Design pharmaceutical aerosols, semisolid preparations and suppositories.		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3. Employ the relevant way to prepare extemporaneous semisolid preparations and suppositories		
c4 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c5 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**
d3. Participate efficiently with colleagues in a team work		
d2. Demonstrate the skills of time management and self-learning	**Lab. practice, group-project, feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**

XVIII. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Pharmaceutical aerosols**	a1, a2, a3, a4, a5, a6, b1, b2, b3	Definition , advantages, disadvantages, types of aerosols, anatomical features of the bronchi, Pressurized packages (Type of propellants , Containers , Formulation aspects, Air-blast nebulizers), methods of preparation (pressurized filling, cold filling), quality control evaluation	3	6
2	**Semisolid dosage forms (1) Introduction**	a1, a2, a3, a4, a5, a6, b1, b2, b3	• **introduction:** definitions, advantages, disadvantages, types, anatomical features and targets of the skin, • Classification of semisolid preparation	1	2
	Semisolid dosage forms :(2)Ointments and pastes	a1, a2, a3, a4, a5, a6, b1, b2, b3	• **ointments** (definitions, advantages, advantages, disadvantages, classification based on type of ointment base, formulation considerations, method of preparation**)** • **Pastes:** (definitions, advantages, advantages, disadvantages, classification based on type of ointment base,	4	8
Mid-term exam				1	2
3	**Semisolid dosage forms (3) Creams and gels**	a1, a2, a3, a4, a5, a6, b1, b2, b3	• **Creams** (definitions, advantages, advantages, disadvantages, classification, formulation considerations, method of preparation • **Gels** (definitions, advantages, classification, formulation **,** considerations, method of preparation	3	6

3	**Suppositories**	a1, a2, a3, a4, a5, a6, b1, b2, b3	definitions, advantages, advantages, disadvantages, classification (rectal, vaginal) formulation, types of suppository bases, method of preparation	3	6
Course Review		a1, a2, a3, a4, a5, a6, b1, b2, b3	Review of the course topics :discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	3 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
141.	Pharmaceutical aerosols: construction and use	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
142.	Preparation of salicylic acid 2 % ointment in simple ointment base	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
143.	Preparation of hydrophilic ointment USP	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
144.	Preparation of Polyethylene glycol ointment base.	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
145.	Preparation of o/ w creams: vanishing cream base	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
146.	Preparation of w/o creams: cold cream base	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
147.	Preparation of hydrophilic gel base : Carbomer or Carboxy methyl cellulose gel	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
148.	Preparation of Aspirin in cocoa butter base suppositories.	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
149.	Preparation of Glycerin suppositories.	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
150.	Preparation of Dusting powders	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
151.	Preparation of Effervescent base granules	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b3, c1,c2, c3, d1, d2, d3
Total		**11**	**22**	

XXX. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XXXI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to present a search report supported with images on 5 trade names (commercial preparations) of the studied dosage forms	c4, c5, d2	4-13	3
2	**Group** :every group is assigned to present an illustrating videos on lab. And industrial preparation of 3 types of studies dosage forms.	c4, c5, d1, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3
		Assignments	7, 12	5	5	c4, c5, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a3, b1
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, a4, a5, a6, b1, b2, b3
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, c3, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	c1, c2, c3, d1, d2, d3
			Total	30	30 %	

XXXI. Learning Resources

1- Required Textbook(s) (maximum two).

1. Aulton M.E., Pharmaceutics: the science of dosage form design, 2013, Churchill Livingstone, UK
2. Linda Felton. Remington Essentials of Pharmaceutics, 2012, Pharmaceutical press, UK

2- Essential References.

1. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA
2. United states pharmacopeia (USP-41, NF 36), 2018, the United States Pharmacopeial Convention.

3- Electronic Materials and Web Sites *etc*.

https://slideplayer.com/slide/5276569/
https://slideplayer.com/slide/4217360/
https://slideplayer.com/slide/3621826/

XX. Course Policies:

45.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
46.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
47.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
48.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of **PHARMACEUTICS II**

Course code (**PHR317**)

I. Course Identification and General Information:

1.	Course Title:	PHARMACEUTICS II			
2.	Course Code &Number:	PHR317			
3.	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	3
4.	Study level/ semester at which this course is offered:	*(Third) Year – (First) semester*			
5.	Pre –requisite (if any):	PHR227 (Pharmaceutics I)			
6.	Co –requisite (if any):	None			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	at the university facility			
10	Prepared by	.			
11	Date of Approval				

II. Course Description:

This course is the second part of "Pharmaceutics "courses that are intended to provide the student with knowledge in preformulation, formulation and preparation of pharmaceutical dosage forms. The course deals with designing of compressed gases (pharmaceutical aerosols), semisolid dosage forms (ointments, creams, pastes and gels) and suppositories. The practical part provides the student with skills to prepare those dosage forms in Pharmaceutics Lab.

هذا المقرر هو الجزء الثاني من مقررات "الصيدلانيات" التي تهدف إلى تزويد الطالب بالمعرفة في دراسات م اقبل الصياغة وصياغة وتحضير الأشكال الدوائية و يركز المقرر على الأشكال الغازية المضغوطة و الأشكال شبه الصلبة (المراهم والكريمات والمعاجين و الجل) و كذلك التحاميل, و يوفر الجزء العملي للطالب المهارات اللازمة لإعداد تلك الأشكال الصيدلانية في مختبر الصيدلانيات.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
A4	Describe analytical methods, principles, design and development techniques	**a1.** Describe the significance of pharmaceutics as art and science of dosage form design
		a2. Explicit the types and roles of excipients included in aerosols, semisolid preparations and suppositories.
		a3. Describe the stages of designing pharmaceutical aerosols, semisolid preparations and suppositories.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the role of pharmacist in formulation of pharmaceutical aerosols, semisolid preparations and suppositories.
A11	Identify the properties of dosage forms and novel drug delivery systems.	**a5.** Explicit the general properties, advantages and disadvantages of pharmaceutical aerosols, semisolid preparations and suppositories.
		a6. Discuss the principles, pharmacopeial requirements, methods of preparation, of various types of pharmaceutical aerosols, semisolid preparations and suppositories.
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify pharmaceutical aerosols, semisolid preparations and suppositories.
		b2. Compare between various types of pharmaceutical aerosols, semisolid preparations and suppositories.
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b3.** Design pharmaceutical aerosols, semisolid preparations and suppositories.
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C5	Employ the relevant ways to produce	**c3.** Employ the relevant way to prepare

	extemporaneous preparations including TPN and IV admixtures.	extemporaneous semisolid preparations and suppositories.
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c4 .**Search efficiently for information using documented and electronic sources of information.
		c5 Present and report his/her works correctly using appropriate writing rules and technologies media.
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals	**d3.** Participate efficiently with colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Describe the significance of pharmaceutics as art and science of dosage form design	**Active Lecture**	**Written exams**
a2. Explicit the types and roles of excipients included in aerosols, semisolid preparations and suppositories.		
a3. Describe the stages of designing pharmaceutical aerosols, semisolid preparations and suppositories.		
a4. Describe the role of pharmacist in formulation of pharmaceutical aerosols, semisolid preparations and suppositories.		
a5. Explicit the general properties, advantages and disadvantages of pharmaceutical aerosols, semisolid preparations and suppositories.		
a6. Discuss the principles, pharmacopeial requirements, methods of preparation, of various types of pharmaceutical aerosols, semisolid preparations and suppositories.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify pharmaceutical aerosols, semisolid preparations and suppositories.	**Active Lecture , Feed-back learning**	**Written exams, quizzes**
b2. Compare between various types of pharmaceutical aerosols, semisolid preparations and suppositories.		
b3. Design pharmaceutical aerosols, semisolid preparations and suppositories.		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3. Employ the relevant way to prepare extemporaneous semisolid preparations and suppositories		
c4 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c5 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**
d3. Participate efficiently with colleagues in a team work		
d2. Demonstrate the skills of time management and self-learning	**Lab. practice, group-project, feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Pharmaceutical aerosols**	a1, a2, a3, a4, a5, a6, b1, b2, b3	Definition , advantages, disadvantages, types of aerosols, anatomical features of the bronchi, Pressurized packages (Type of propellants , Containers , Formulation aspects, Air-blast nebulizers), methods of preparation (pressurized filling, cold filling), quality control evaluation	3	6
2	**Semisolid dosage forms (1) Introduction**	a1, a2, a3, a4, a5, a6, b1, b2, b3	• **introduction:** definitions, advantages, disadvantages, types, anatomical features and targets of the skin, • Classification of semisolid preparation	1	2
	Semisolid dosage forms :(2)Ointments and pastes	a1, a2, a3, a4, a5, a6, b1, b2, b3	• **ointments** (definitions, advantages, advantages, disadvantages, classification based on type of ointment base, formulation considerations, method of preparation**)** • **Pastes:** (definitions, advantages, advantages, disadvantages, classification based on type of ointment base,	4	8
Mid-term exam				1	2
3	**Semisolid dosage forms (3) Creams and gels**	a1, a2, a3, a4, a5, a6, b1, b2, b3	• **Creams** (definitions, advantages, advantages, disadvantages, classification, formulation considerations, method of preparation • **Gels** (definitions, advantages, classification, formulation **,** considerations, method of preparation	3	6

3	**Suppositories**	a1, a2, a3, a4, a5, a6, b1, b2, b3	definitions, advantages, advantages, disadvantages, classification (rectal, vaginal) formulation, types of suppository bases, method of preparation	3	6
Course Review		a1, a2, a3, a4, a5, a6, b1, b2, b3	Review of the course topics :discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	3 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	Pharmaceutical aerosols: construction and use	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
2.	Preparation of salicylic acid 2 % ointment in simple ointment base	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
3.	Preparation of hydrophilic ointment USP	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
4.	Preparation of Polyethylene glycol ointment base.	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
5.	Preparation of o/ w creams: vanishing cream base	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
6.	Preparation of w/o creams: cold cream base	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
7.	Preparation of hydrophilic gel base : Carbomer or Carboxy methyl cellulose gel	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
8.	Preparation of Aspirin in cocoa butter base suppositories.	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
9.	Preparation of Glycerin suppositories.	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
10.	Preparation of Dusting powders	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
11.	Preparation of Effervescent base granules	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b3, c1,c2, c3, d1, d2, d3
Total		**11**	**22**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to present a search report supported with images on 5 trade names (commercial preparations) of the studied dosage forms	c4, c5, d2	4-13	3
2	**Group: every** group is assigned to present an illustrating videos on lab. And industrial preparation of 3 types of studies dosage forms.	c4, c5, d1, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3
		Assignments	7, 12	5	5	c4, c5, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a3, b1
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, a4, a5, a6, b1, b2, b3
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, c3, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	c1, c2, c3, d1, d2, d3
			Total	30	30 %	

VIII. Learning Resources

1- Required Textbook(s) (maximum two).

1. Aulton M.E., Pharmaceutics: the science of dosage form design, 2013, Churchill Livingstone, UK
2. Linda Felton. Remington Essentials of Pharmaceutics, 2012, Pharmaceutical press, UK

2- Essential References.

1. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA
2. United states pharmacopeia (USP-41, NF 36), 2018, the United States Pharmacopeial Convention.

3- Electronic Materials and Web Sites *etc*.

https://slideplayer.com/slide/5276569/
https://slideplayer.com/slide/4217360/
https://slideplayer.com/slide/3621826/

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

Pharmacology & Therapeutics I

Course Code (**PHR313**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XXXVI. Course Identification and General Information:

28	**Course Title:**	**Pharmacology & Therapeutics I**					
28	**Course Code &Number:**	**PHR313**					
28	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	3
28	**Study level/ semester at which this course is offered:**	*(3RD) Year – (FIRST) semester*					
29	**Pre –requisite (if any):**						
29	**Co –requisite (if any):**	**(PHR314) Medicinal chemistry I**					
29	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**					
29	**Language of teaching the course:**	**ENGLISH**					
29	**Location of teaching the course:**	**At the university facility**					
29	**Date of Approval**						

L: lecturing ; Tut: Tutorial , S: seminar ; P: practical ; Tr.: training

XXXVII. Course Description:

The course provides the students with knowledge of general pharmacology including sources of drugs, introduction to pharmacokinetics, pharmacodynamic aspects such as mechanisms of actions of drugs, drug/response curve, drug adverse reactions, drug-drug interactions, etc. The course also covers the study of pharmacodynamic and pharmacokinetics of drugs affecting autonomic nervous system and autacoids

يزود المقرر الدراسي الطلاب بالمعرفة الأساسية عن علم الأدوية العام بما في ذلك مصادر الأدوية، ومقدمة عن الحرائك الدوائية ، والجوانب الديناميكية الدوائية) مثل آليات عمل الأدوية ، ومنحنى الاستجابة الدوائية ، ردود الفعل العكسية للأدوية ، و التداخلات الدوائية ، إلخ. يغطي المقرر أيضا دراسة الديناميكا الدوائية والحركية الدوائية للأدوية التي تؤثر على الجهاز العصبي اللاإرادي و الأدوية المؤثرة على العوامل الحيوية التي تعمل كهرمونات محلية(autacoids) .

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

22. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A5	Identify actions of medicines on human body.	**a1.** Identify the actions of medicines in human body, their therapeutic uses, adverse effects drug interactions and interactions
A8	Describe Biopharmaceutics and pharmacokinetics of medicines	**a2.** Describe the pharmacokinetics of drugs.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in providing correct information on rational use of medications.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1 .**Classify drugs used for disorders of drugs affecting autonomic nervous system and autacoids.
		b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency)and drug limitations.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1 .** Advise the patient and healthcare professional to optimize medicine use
Transferable skills : Upon successful completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate time management and decision making skills.

23. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the actions of medicines in human body, their therapeutic uses, adverse effects drug interactions and interactions	**Active Lecture**	**Written exams**
a2. Describe the pharmacokinetics of drugs.		
a3. Describe the role of pharmacist in providing correct information on rational use of medications.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 . Classify drugs used for disorders of drugs affecting autonomic nervous system and autacoids.	**Active Lecture**	**Written exams**
b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency)and drug limitations.	**Active Lecture , feed-back learning**	**Written exam , quizzes, assignments**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Advise the patient and healthcare professional to optimize medicine use	**feed-back learning**	**assignment**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate time management and decision making skills.	**Feed-back learning**	**Assignments**

XXIX. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**General pharmacology**	a1, a2, a3, b1	Introduction Pharmacology Definitions, Sources of drugs, Drug nomenclature, Routes of administration	1	3
			Pharmacokinetics Absorption, Distribution	1	3
			Pharmacokinetics Metabolism, Excretion	1	3
			Pharmacodynamics Mechanisms of drug actions, Drug/response curves, Types of drugs (agonists, antagonists)	1	3
			Pharmacodynamics , Adverse drug effects, drug-drug interactions	1	3
2	**Drugs acting on the autonomic nervous system**		Introduction to ANS Divisions of ANS, functions, neurotransmitters, receptors	1	3
			Parasympathomimetics Direct-acting drugs, indirect-acting drugs, toxicity with organo-phosphorous compounds pesticides and war gases	1	3
			Mid-term exam	1	3
			Parasympatholytics	1	3
			Sympathomimetics Direct acting drugs (selective, non-selective) , indirect acting drugs, dualist drugs	1	3
			Sympatholytics Alpha-blockers, beta-blockers , Adrenergic neuron depressants	1	3

3	**Autacoids pharmacology:**	a1, a2, a3, b1	Autacoids: histamine & serotonin. Types and drugs affecting	4	12
FINAL – EXAM				1	3
TOTAL				16	48
Number of Weeks /and Units Per Semester				16 weeks	3 Units

XXXI. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

XXXII. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to solve a list of problems related to advising healthcare of medicines use based comparison of drug benefits and risks for specific patients e.g. CVS patients, renal failure patients, etc.	b1, c1, d1	6-12	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b2
		Assignments	7, 12	10	10	b1, c1, d1
2	Mid-semester exam (written exam)		7	20	20	a1, a2, a3, b1
3	Final exam (written exam)		16	60	60	a1, a2, a3, b1
			TOTAL	100	100 %	

XXXII. Learning Resources:

1- Required Textbook(s) (maximum two).

Katzung –Basic and Clinical Pharmacology, (2014), McGraw-Hill

2- Essential References.

Rang, Dale and Ritter. Pharmacology, (2018), Churchill Livingstone.

3- Electronic Materials and Web Sites *etc*.

1- https://www.guidetopharmacology.org/
https://www.powershow.com/view4/70aa9b-zmy5o/general_pharmacology_powerpoint_ppt_presentation
https://www.powershow.com/viewht/478e07-MGVmN/Basic_Pharmacology_powerpoint_ppt_presentation

XXI. Course Policies:	
49.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
50.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
51.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
52.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

Pharmacology & Therapeutics I

I. Course Identification and General Information:

1.	**Course Title:**	**Pharmacology & Therapeutics I**					
2.	**Course Code &Number:**	**PHR313**					
3.	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	3
4.	**Study level/ semester at which this course is offered:**	*(3RD) Year – (FIRST) semester*					
5.	**Pre –requisite (if any):**						
6.	**Co –requisite (if any):**	**(PHR314) Medicinal chemistry I**					
7.	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**					
8.	**Language of teaching the course:**	**ENGLISH**					
9.	**Location of teaching the course:**	**At the university facility**					
10	**Date of Approval**						

II. Course Description:

The course provides the students with knowledge of general pharmacology including sources of drugs, introduction to pharmacokinetics, pharmacodynamic aspects such as mechanisms of actions of drugs, drug/response curve, drug adverse reactions, drug-drug interactions, etc. The course also covers the study of pharmacodynamic and pharmacokinetics of drugs affecting autonomic nervous system and autacoids

يزود المقرر الدراسي الطلاب بالمعرفة الأساسية عن علم الأدوية العام بما في ذلك مصادر الأدوية، ومقدمة عن الحرائك الدوائية، والجوانب الديناميكية الدوائية) مثل آليات عمل الأدوية، ومنحنى الاستجابة الدوائية، ردود الفعل العكسية للأدوية، والتداخلات الدوائية، إلخ. يغطي المقرر أيضا دراسة الديناميكا الدوائية والحركية الدوائية للأدوية التي تؤثر على الجهاز العصبي اللاإرادي والأدوية المؤثرة على العوامل الحيوية التي تعمل كهرمونات محلية(autacoids).

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A5	Identify actions of medicines on human body.	**a1.** Identify the actions of medicines in human body, their therapeutic uses, adverse effects drug interactions and interactions
A8	Describe Biopharmaceutics and pharmacokinetics of medicines	**a2.** Describe the pharmacokinetics of drugs.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in providing correct information on rational use of medications.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1 .**Classify drugs used for disorders of drugs affecting autonomic nervous system and autacoids.
		b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency)and drug limitations.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1.** Advise the patient and healthcare professional to optimize medicine use
Transferable skills : Upon successful completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate time management and decision making skills.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the actions of medicines in human body, their therapeutic uses, adverse effects drug interactions and interactions	**Active Lecture**	**Written exams**
a2. Describe the pharmacokinetics of drugs.		
a3. Describe the role of pharmacist in providing correct information on rational use of medications.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 . Classify drugs used for disorders of drugs affecting autonomic nervous system and autacoids.	**Active Lecture**	**Written exams**
b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency)and drug limitations.	**Active Lecture , feed-back learning**	**Written exam , quizzes, assignments**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Advise the patient and healthcare professional to optimize medicine use	**feed-back learning**	**assignment**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate time management and decision making skills.	**Feed-back learning**	**Assignments**

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**General pharmacology**	a1, a2, a3, b1	Introduction Pharmacology Definitions, Sources of drugs, Drug nomenclature, Routes of administration	1	3
			Pharmacokinetics Absorption, Distribution	1	3
			Pharmacokinetics Metabolism, Excretion	1	3
			Pharmacodynamics Mechanisms of drug actions, Drug/response curves, Types of drugs (agonists, antagonists)	1	3
			Pharmacodynamics , Adverse drug effects, drug-drug interactions	1	3
2	**Drugs acting on the autonomic nervous system**		Introduction to ANS Divisions of ANS, functions, neurotransmitters, receptors	1	3
			Parasympathomimetics Direct-acting drugs, indirect-acting drugs, toxicity with organo-phosphorous compounds pesticides and war gases	1	3
			Mid-term exam	1	3
			Parasympatholytics	1	3
			Sympathomimetics Direct acting drugs (selective, non-selective) , indirect acting drugs, dualist drugs	1	3
			Sympatholytics Alpha-blockers, beta-blockers , Adrenergic neuron depressants	1	3

3	**Autacoids pharmacology:**	a1, a2, a3, b1	Autacoids: histamine, serotonin. Types and drugs affecting	4	12
FINAL - EXAM				1	3
TOTAL				16	48
Number of Weeks /and Units Per Semester				16 weeks	3 Units

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to solve a list of problems related to advising healthcare of medicines use based comparison of drug benefits and risks for specific patients e.g. CVS patients, renal failure patients, etc.	b1, c1, d1	6-12	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b2
		Assignments	7, 12	10	10	b1, c1, d1
2	Mid-semester exam (written exam)		7	20	20	a1, a2, a3, b1
3	Final exam (written exam)		16	60	60	a1, a2, a3, b1
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Katzung –Basic and Clinical Pharmacology, (2014), McGraw-Hill

2- Essential References.

Rang, Dale and Ritter. Pharmacology, (2018), Churchill Livingstone.

3- Electronic Materials and Web Sites *etc*.

1- https://www.guidetopharmacology.org/
https://www.powershow.com/view4/70aa9b-zmy5o/general_pharmacology_powerpoint_ppt_presentation
https://www.powershow.com/viewht/478e07-MGVmN/Basic_Pharmacology_powerpoint_ppt_presentation

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Bachelor Program of Pharmacy

Course specification of

Clinical Immunology

Course Code (**PHR324**)

I. Course Identification and General Information:

1.	**Course Title:**	**Clinical immunology**					
2.	**Course Code &Number:**	**PHR324**					
3.	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
4.	**Study level/ semester at which this course is offered:**	*(THIRD) Year – (2nd) semester*					
5.	**Pre –requisite (if any):**						
6.	**Co –requisite (if any):**	PHR325 (Pharmacology & therapeutics II)					
7.	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**					
8.	**Language of teaching the course:**	**ENGLISH**					
9.	**Location of teaching the course:**	**At the university facility**					
10	**Date of Approval**						

II. Course Description:

Clinical Immunology course provides the basic principles of human body's defense components, mechanisms, diseases of immune system. This course topics include cells and divisions of immune response, humoral and cell-mediated immune responses, immune cells activation, immune-prophylaxis, immunodeficiency, hypersensitivity, autoimmunity and transplantation.

يقدم مقرر علم المناعة السريري المبادئ الأساسية لمكونات وآليات وأمراض جهاز المناعة في جسم الإنسان. تشمل موضوعات هذا المقرر الدراسي خلايا وتقسيمات الاستجابة المناعية ، والاستجابات المناعية الخلطية والخلايا ، وتنشيط الخلايا المناعية ، والوقاية المناعية ، ونقص المناعة ، وفرط الحساسية ، والمناعة الذاتية ، والزرع.

III. Course Intended Learning Outcomes (CILOs) :		**Referenced PILOs**	
A. Knowledge and Understanding: Upon successful completion of the course, students will be able to:			
a1	Describe cells, molecules and mechanisms involved in different immune responses.	**A1**	Describe the scientific basis of pharmacy and the relevant biomedical and behavioral sciences which form the basis for understanding human growth, development and health.
A2	Demonstrate understanding of immunological diseases.		
A3	Identify potential immunotherapeutic products and their targets including vaccines, antibodies, immune-suppressants, cytokines and related products.	**A4**	Describe the different clinical, laboratory and special investigatory procedures practiced in pharmacy.
B. Intellectual Skills: Upon successful completion of the course, students will be able to:			
b1	Explain mechanisms of the immune responses and how relevant microbial agents targets the immune system.	**B1**	Incorporate theoretical basic biomedical, behavioral and pharmacy sciences with the clinical signs and symptoms for appropriate understanding of disease and its management.
B2	Confer excellent understanding on immune agents classes, action and targets at different stages of a certain diseases.	**B2**	Apply critical thinking and evidence-based problem solving when providing patient's care.
C. Professional and Practical Skills: Upon successful completion of the course, students will be able to:			
c1	Select appropriate methods of diagnosis of immune responses diseases.	**C1**	Obtain and record a comprehensive history, perform an appropriate physical examination, and carry out

			different investigations to reach a correct diagnosis and treatment
c2	Use basic knowledge in immune response to carry researches on immune diseases.	**C3**	Apply infection control and radiation protection according to international standards
D. Transferable Skills: Upon successful completion of the course, students will be able to:			
d1	Communicate effectively and ethically with patients and his colleague in health services sector.	**D3**	Demonstrate leadership and teamwork skills with colleagues and other health team for effective delivery of health care.
D2	Use computer and IT skills to gather, appraise and evaluate evidences of immunology in context of clinical and scientific standards.	**D1**	Commit to continuous education, self-development and lifelong learning to remain updated with advances in pharmacy practice

(A) Alignment of Course Intended Learning Outcomes (Knowledge and Understanding) to Teaching Strategies and Assessment Methods:

	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
a1	Describe cells, molecules and mechanisms involved in different immune responses.	• Active Lectures	• Written Exam, • quizzes
a2	Demonstrate understanding of immunological diseases.	• Active Lectures	• Written exams • Assignments
a3	Identify potential immunotherapeutic products and their targets including vaccines, antibodies, immune-suppressants, cytokines and related products.	▪ Active Lectures	▪ Written Exam, ▪ quizzes

(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching

Strategies and Assessment Methods:			
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
b1	Explain mechanisms of the immune responses and how relevant microbial agents targets the immune system.	▪ Active Lectures	▪ Quizzes ▪ Assignments
b2	Confer excellent understanding on immune agents classes, action and targets at different stages of a certain diseases.	▪ Active Lectures	▪ Quizzes ▪ Written Exam, ▪ Assignments
I Alignment of Course Intended Learning Outcomes (Professional and Practical Skills) to Teaching Strategies and Assessment Methods:			
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
c1	Select appropriate methods of diagnosis of immune responses diseases.	▪ Feed-back learning	▪ Assignment
c2	Use basic knowledge in immune response to carry researches on immune diseases.	▪ Active Lectures (supported with discussion), ▪ Group learning and Problem-based learning, ▪ Seminars ▪ Project work, ▪ Directed self-study.	▪ Short essays, ▪ Written Exam, ▪ Seminar assessment, ▪ Assignments
(D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods:			
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
d1	Communicate effectively and ethically with patients and his colleague in health services sector.	▪ Active Lectures (supported with discussion), ▪ Group learning and Problem-based learning,	▪ Faculty assessment by structured observation through checklists and rating scales,

		▪ Seminars, journal clubs and workshops, ▪ Use of communication and information technology, ▪ Project work,	▪ Seminar assessment, ▪ Case study Q. ▪ Discussion
d2	Use computer and IT skills to gather, appraise and evaluate evidences of immunology in context of clinical and scientific standards.	▪ Active Lectures (supported with discussion), ▪ Group learning and Problem-based learning, ▪ Seminars, journal clubs and workshops, ▪ Computer and web-based learning, ▪ Use of communication and information technology, ▪ Project work, ▪ Directed self-study.	▪ Short essays, ▪ Faculty assessment by structured observation through checklists and rating scales, ▪ Seminar assessment, ▪ Work samples, such as, logbooks and portfolios.

IV. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	**Cells and organs of the immune system**	• Cells of immune system and their development • Lymphoid organs (primary and secondary) • Lymphocytes and their subsets • Immune cell activation steps (activation, proliferation and differentiation) • Main divisions of immunity and comparison between Innate and adaptive immunity	1	2	a1, b1, c1, c2, d1

2	**Innate immunity**	• Definition
		• Mechanisms of innate immunity
		  • Anatomical Barrier and surface secretions
		  • Soluble molecules.
		  • Cellular components and functions
		  • Phagocytosis
		  • Microbial flora
		  • Inflammation
			1	2	a1, c1, d1

3	**Antigens**	• Definitions of antigen and immunogen • Hapten • epitopes • Factors affecting immunogenicity. • Types of antigens of bacteria, viruses, environmental and human	1	2	a1, c1, c2, d1

		• Types of T cell and B cell antigens. • Super-antigens.			
4	**Humoral immune response**	• B cell surface molecules • B cell antigens (T-dependent and T-independent) • Antibody structure and functions • Isotypes structure, percentage, production and functions (IgG, IgM, IgA, IgD, IgE) • Primary and secondary immune response • Cross reaction • Monoclonal and polyclonal antibodies	1	2	a1, b1, c1, c2, d1, d2
5	**Major histocombatibility complex (MHC)**	• Definition • MHC origin and Importance • Genes organization and inheritance • Types, structure and expression • MHC characteristics (polygenism, polymorphism haplotype, codominance) • Types of transplants and graft rejection • MHC and diseases	1	2	a1, b1, c2, d1
6	**Cell mediated immunity Antigen presentation**	• Antigen presenting cells (APCs) • Endogenous pathway of antigen processing and presentation • Exogenous pathway of antigen processing and presentation • T cell surface molecules and markers • T cell activation and three signal hypothesis • Effector T cells	1	2	a1, b1, c1, c2, d1

		• Control of T cell activation			
7	**Complement**	• Definition. • Importance • Activation Pathways and mechanisms. • Biological Functions. • Complements inhibitors	1	2	a1, b1, c1, c2, d1
8	**Mid-Term Theoretical Exam**		1	2	a1, b1, c2
9	**Hypersensitivity reactions**	▪ Definition ▪ Type I (immediate hypersensitivity) ▪ Allergens ▪ Pathophysiology ▪ Examples (Diseases; systemic and local) • Diagnosis & Treatment • Other types (II, III, IV)	2	4	a1, a2, a3, b1, b2, c1, c2, d1
10	**Vaccines**	• Active and passive immunization • Properties of ideal vaccine, • types of vaccines; whole cell vaccines; (live attenuated and killed vaccines), subunit vaccines; synthetic peptides, recombinant, DNA vaccines, anti-ideotypes , and edible vaccines. • Adjuvants • Vaccines FDA regulations and testing	1	2	a3, b1, b2, c1, c2, d1, d2
11	**Immunodeficiency**	• Definition and classification • Primary immunodeficiency • Classification, pathophysiology, clinical features, diagnosis and treatment • Secondary immunodeficiency	1	2	a2, a2, b1, b2, c1, c2, d1, d2

		• Classification, pathophysiology, clinical features, diagnosis and treatment			
12	**Autoimmunity**	• Immunological Tolerance • Autoimmune diseases classifications, causes and susceptibility • systemic autoimmune diseases (SLE & RA) • organ specific autoimmune diseases (DM, and thyroid diseases)	2	4	a1, a2, a3, b1, c1, c2, d1
13	**Transplantation and Immunosuppression**	• Transplantation • Types of Rejection • Transplantation Immunology • Immunosuppressive Agents • Immunophilin Binding Agents • Antibody immunosuppression Therapy • Cytokine Inhibitor Therapy	1	2	a1, a2, a3, b1, b2, c1, c2, d1, d2
14	**Final Theoretical Exam**		1	2	a1, a2, a3, b1, b2, c1, c2
Number of Weeks /and Units Per Semester			**16**	**32**	

V. Teaching Strategies of the Course:

- Active Lectures (supported with discussion),
- Group work
- Feed-back learning

VI. Assessment Methods of the Course:

- Written exams
- Quizzes
- Assignment assessment

VII. Assignments:

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	**Report on immune responses?**	4	**5**	a3, b1, b2, c1, d1, d2
2	**Recent reports on immune responses against tumour?**	13	**5**	a1, a2, a3, b1, b2, c1, c2, d1, d2
Total			**10**	

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	**Assignments**	4,13 W	10	10%	a1, a2, a3, b1, b2, c1, c2, d1, d2
2	**Quizzes 1 & 2**	6,12 W	10	10%	a1, a2, b1, b2, c2
3	**Mid-Term Theoretical Exam**	8 W	20	20%	a1, b1, c2
4	**Final Theoretical Exam**	16 W	60	60%	a1, a2, a3, b1, b2, c1, c2
Total			**100**	**100%**	

IX. Learning Resources:

- *Written in the following order:* Author, Year of publication, **Title**, Edition, Place of publication, Publisher.

1- Required Textbook(s) (maximum two): مثال example

1) Roitt I,M, Delves P,J, 2016 Roitt's Essential Immnuology. 13th edition, Blackwell Science Ltd. Massachusetts. USA.
2) Owen J,A, Punt J, Stranford S,A, Jones P,P, 2019, Kuby immunology. 8th edition. W. H. Freeman and company. USA.

2- Essential References:

1) Chapel H, Haeney B, Misbah S, Snowden N, (2014) Essentials of Clinical Immunology, 6th ed. By John Wiley & Sons, Ltd, UK.
2) Zabriskie, J,B, 2009, Essential Clinical Immunology. 2rd ed . New York: Cambridge University Press.

3- Electronic Materials and Web Sites etc.:

Websites:

1. International Union of Immunlogical Societies https://iuis.org/
2. Immunopaedia: educational website. https://www.immunopaedia.org.za/
3. Immunology Videos https://www.immunology.utoronto.ca/immunology-videos
4. The British Society for Allergy & Clinical Immunology (BSACI) https://www.bsaci.org/
5. National institute of allergy and infectious diseases https://www.niaid.nih.gov/
6. The American College of Allergy, Asthma and Immunology https://college.acaai.org/
7. British Society for Allergy & Clinical Immunology www.BSACI.org

8. European Society for Immunodeficiencies
www.esid.org
9. Immune Deficiency Foundation (US-based information)
www.primaryimmune.org
10. American Cancer Society, Immunotherapy
https://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/immunotherapy.html

X. Course Policies: (Based on the Uniform Students' By law (2007)

1	**Class Attendance:** Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	**Tardiness:** A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	**Exam Attendance/Punctuality:** No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	**Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	**Cheating:** Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	**Forgery and Impersonation:** Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply**.**
7	**Other policies:** The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy

Course Plan (Syllabus) of Clinical Immunology

I. Course Identification and General Information:

1.	**Course Title:**	**Clinical immunology**					
2.	**Course Code &Number:**	**PHR324**					
3.	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
4.	**Study level/ semester at which this course is offered:**	*(THIRD) Year – (2nd) semester*					
5.	**Pre –requisite (if any):**						
6.	**Co –requisite (if any):**	PHR325 (Pharmacology & therapeutics II)					
7.	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**					
8.	**Language of teaching the course:**	**ENGLISH**					
9.	**Location of teaching the course:**	**At the university facility**					
10	**Date of Approval**						

II. Course Description:

Clinical Immunology course provides the basic principles of human body's defense components, mechanisms, diseases of immune system. This course topics include cells and divisions of immune response, humoral and cell-mediated immune responses, immune cells activation, immune-prophylaxis, immunodeficiency, hypersensitivity, autoimmunity and transplantation.

يقدم مقرر علم المناعة السريري المبادئ الأساسية لمكونات وآليات وأمراض جهاز المناعة في جسم الإنسان. تشمل موضوعات هذا المقرر الدراسي خلايا وتقسيمات الاستجابة المناعية ، والاستجابات المناعية الخلطية والخلايا ، وتنشيط الخلايا المناعية ، والوقاية المناعية ، ونقص المناعة ، وفرط الحساسية ، والمناعة الذاتية ، والزرع.

III. Course Intended Learning Outcomes (CILOs) :		**Referenced PILOs**	
A. Knowledge and Understanding: Upon successful completion of the course, students will be able to:			
a1	Describe cells, molecules and mechanisms involved in different immune responses.	**A1**	Describe the scientific basis of pharmacy and the relevant biomedical and behavioral sciences which form the basis for understanding human growth, development and health.
a2	Demonstrate understanding of immunological diseases.		
a3	Identify potential immunotherapeutic products and their targets including vaccines, antibodies, immune-suppressants, cytokines and related products.	**A4**	Describe the different clinical, laboratory and special investigatory procedures practiced in pharmacy.
B. Intellectual Skills: Upon successful completion of the course, students will be able to:			
b1	Explain mechanisms of the immune responses and how relevant microbial agents targets the immune system.	**B1**	Incorporate theoretical basic biomedical, behavioral and pharmacy sciences with the clinical signs and symptoms for appropriate understanding of disease and its management.
b2	Confer excellent understanding on immune agents classes, action and targets at different stages of a certain diseases.	**B2**	Apply critical thinking and evidence-based problem solving when providing patient's care.
C. Professional and Practical Skills: Upon successful completion of the course, students will be able to:			
c1	Select appropriate methods of diagnosis of immune responses diseases.	**C1**	Obtain and record a comprehensive history, perform an appropriate physical examination, and carry out

			different investigations to reach a correct diagnosis and treatment
c2	Use basic knowledge in immune response to carry researches on immune diseases.	**C3**	Apply infection control and radiation protection according to international standards
D. Transferable Skills: Upon successful completion of the course, students will be able to:			
d1	Communicate effectively and ethically with patients and his colleague in health services sector.	**D3**	Demonstrate leadership and teamwork skills with colleagues and other health team for effective delivery of health care.
d2	Use computer and IT skills to gather, appraise and evaluate evidences of immunology in context of clinical and scientific standards.	**D1**	Commit to continuous education, self-development and lifelong learning to remain updated with advances in pharmacy practice

(A) Alignment of Course Intended Learning Outcomes (Knowledge and Understanding) to Teaching Strategies and Assessment Methods:

	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
a1	Describe cells, molecules and mechanisms involved in different immune responses.	• Active Lectures	• Written Exam, • quizzes
a2	Demonstrate understanding of immunological diseases.	• Active Lectures	• Written exams • Assignments
a3	Identify potential immunotherapeutic products and their targets including vaccines, antibodies, immune-suppressants, cytokines and related products.	▪ Active Lectures	▪ Written Exam, ▪ quizzes

(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching

Strategies and Assessment Methods:			
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
b1	Explain mechanisms of the immune responses and how relevant microbial agents targets the immune system.	▪ Active Lectures	▪ Quizzes ▪ Assignments
b2	Confer excellent understanding on immune agents classes, action and targets at different stages of a certain diseases.	▪ Active Lectures	▪ Quizzes ▪ Written Exam, ▪ Assignments
(C) Alignment of Course Intended Learning Outcomes (Professional and Practical Skills) to Teaching Strategies and Assessment Methods:			
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
c1	Select appropriate methods of diagnosis of immune responses diseases.	▪ Feed-back learning	▪ Assignment
c2	Use basic knowledge in immune response to carry researches on immune diseases.	▪ Active Lectures (supported with discussion), ▪ Group learning and Problem-based learning, ▪ Seminars ▪ Project work, ▪ Directed self-study.	▪ Short essays, ▪ Written Exam, ▪ Seminar assessment, ▪ Assignments
(D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods:			
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
d1	Communicate effectively and ethically with patients and his colleague in health services sector.	▪ Active Lectures (supported with discussion), ▪ Group learning and Problem-based learning,	▪ Faculty assessment by structured observation through checklists and rating scales,

		▪ Seminars, journal clubs and workshops, ▪ Use of communication and information technology, ▪ Project work,	▪ Seminar assessment, ▪ Case study Q. ▪ Discussion
d2	Use computer and IT skills to gather, appraise and evaluate evidences of immunology in context of clinical and scientific standards.	▪ Active Lectures (supported with discussion), ▪ Group learning and Problem-based learning, ▪ Seminars, journal clubs and workshops, ▪ Computer and web-based learning, ▪ Use of communication and information technology, ▪ Project work, ▪ Directed self-study.	▪ Short essays, ▪ Faculty assessment by structured observation through checklists and rating scales, ▪ Seminar assessment, ▪ Work samples, such as, logbooks and portfolios.

IV. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	**Cells and organs of the immune system**	• Cells of immune system and their development • Lymphoid organs (primary and secondary) • Lymphocytes and their subsets • Immune cell activation steps (activation, proliferation and differentiation) • Main divisions of immunity and comparison between Innate and adaptive immunity	1	2	a1, b1, c1, c2, d1

2	**Innate immunity**	• Definition
		• Mechanisms of innate immunity
		  • Anatomical Barrier and surface secretions
		  • Soluble molecules.
		  • Cellular components and functions
		  • Phagocytosis
		  • Microbial flora
		  • Inflammation
			1	2	a1, c1, d1

3	**Antigens**	• Definitions of antigen and immunogen • Hapten • epitopes • Factors affecting immunogenicity. • Types of antigens of bacteria, viruses, environmental and human • Types of T cell and B cell antigens. • Super-antigens.	1	2	a1, c1, c2, d1
4	**Humoral immune response**	• B cell surface molecules • B cell antigens (T-dependent and T-independent) • Antibody structure and functions • Isotypes structure, percentage, production and functions (IgG, IgM, IgA, IgD, IgE) • Primary and secondary immune response • Cross reaction • Monoclonal and polyclonal antibodies	1	2	a1, b1, c1, c2, d1, d2
5	**Major histocombatibility**	• Definition • MHC origin and Importance	1	2	a1, b1, c2, d1

	complex (MHC)	• Genes organization and inheritance • Types, structure and expression • MHC characteristics (polygenism, polymorphism haplotype, codominance) • Types of transplants and graft rejection • MHC and diseases			
6	**Cell mediated immunity Antigen presentation**	• Antigen presenting cells (APCs) • Endogenous pathway of antigen processing and presentation • Exogenous pathway of antigen processing and presentation • T cell surface molecules and markers • T cell activation and three signal hypothesis • Effector T cells • Control of T cell activation	1	2	a1, b1, c1, c2, d1
7	**Complement**	• Definition. • Importance • Activation Pathways and mechanisms. • Biological Functions. • Complements inhibitors	1	2	a1, b1, c1, c2, d1
8	**Mid-Term Theoretical Exam**		1	2	a1, b1, c2
9	**Hypersensitivity reactions**	▪ Definition ▪ Type I (immediate hypersensitivity) ▪ Allergens ▪ Pathophysiology ▪ Examples (Diseases; systemic and local) • Diagnosis & Treatment	2	4	a1, a2, a3, b1, b2, c1, c2, d1

		• Other types (II, III, IV)			
10	**Vaccines**	• Active and passive immunization • Properties of ideal vaccine, • types of vaccines; whole cell vaccines; (live attenuated and killed vaccines), subunit vaccines; synthetic peptides, recombinant, DNA vaccines, anti-ideotypes , and edible vaccines. • Adjuvants • Vaccines FDA regulations and testing	1	2	a3, b1, b2, c1, c2, d1, d2

11	**Immunodeficiency**	• Definition and classification
		• Primary immunodeficiency
		  • Classification, pathophysiology, clinical features, diagnosis and treatment
		• Secondary immunodeficiency
		  • Classification, pathophysiology, clinical features, diagnosis and treatment
			1	2	a2, a2, b1, b2, c1, c2, d1, d2

12	**Autoimmunity**	• Immunological Tolerance • Autoimmune diseases classifications, causes and susceptibility • systemic autoimmune diseases (SLE & RA) • organ specific autoimmune diseases (DM, and thyroid diseases)	2	4	a1, a2, a3, b1, c1, c2, d1
13	**Transplantation and Immunosuppressio**	• Transplantation • Types of Rejection • Transplantation Immunology	1	2	a1, a2, a3, b1, b2, c1,

	n	• Immunosuppressive Agents • Immunophilin Binding Agents • Antibody immunosuppression Therapy • Cytokine Inhibitor Therapy			c2, d1, d2
14	**Final Theoretical Exam**		1	2	a1, a2, a3, b1, b2, c1, c2
Number of Weeks /and Units Per Semester			**16**	**32**	

V. Teaching Strategies of the Course:

- Active Lectures (supported with discussion),
- Group work
- Feed-back learning

VI. Assessment Methods of the Course:

- Written exams
- Quizzes
- Assignment assessment

VII. Assignments:

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	**Report on immune responses?**	4	**5**	a3, b1, b2, c1, d1, d2
2	**Recent reports on immune responses against tumour?**	13	**5**	a1, a2, a3, b1, b2, c1, c2, d1, d2
Total			**10**	

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	**Assignments**	4,13 W	10	10%	a1, a2, a3, b1, b2, c1, c2, d1, d2
2	**Quizzes 1 & 2**	6,12 W	10	10%	a1, a2, b1, b2, c2
3	**Mid-Term Theoretical Exam**	8 W	20	20%	a1, b1, c2
4	**Final Theoretical Exam**	16 W	60	60%	a1, a2, a3, b1, b2, c1, c2
Total			**100**	**100%**	

IX. Learning Resources:

- *Written in the following order:* Author, Year of publication, **Title**, Edition, Place of publication, Publisher.

1- Required Textbook(s) (maximum two): مثال example

1) Roitt I,M, Delves P,J, 2016 Roitt's Essential Immnuology. 13th edition, Blackwell Science Ltd. Massachusetts. USA.
2) Owen J,A, Punt J, Stranford S,A, Jones P,P, 2019, Kuby immunology. 8th edition. W. H. Freeman and company. USA.

2- Essential References:

3) Chapel H, Haeney B, Misbah S, Snowden N, (2014) Essentials of Clinical Immunology, 6th ed. by John Wiley & Sons, Ltd, UK.
4) Zabriskie, J,B, 2009, Essential Clinical Immunology. 2rd ed . New York: Cambridge University Press.

3- Electronic Materials and Web Sites etc.:

Websites:

1. International Union of Immunlogical Societies
   https://iuis.org/
2. Immunopaedia: educational website.
   https://www.immunopaedia.org.za/
3. Immunology Videos
   https://www.immunology.utoronto.ca/immunology-videos

X. Course Policies: (Based on the Uniform Students' By law (2007)

1	**Class Attendance:** Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	**Tardiness:** A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	**Exam Attendance/Punctuality:** No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	**Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	**Cheating:** Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	**Forgery and Impersonation:** Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply**.**
7	**Other policies:** The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

General Pharmacognosy II

Course Code (**PHR322**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

II. Course Identification and General Information:

11	**Course Title:**	**General Pharmacognosy II**			
12	**Course Code &Number:**	**PHR322**			
13	**Credit hours:**	C.H			TOTAL
		Lecture	P.	Tr.	
		2	1	-	**3**
14	**Study level/ semester at which this course is offered:**	*(THIRD) Year – (2nd) semester*			
15	**Pre –requisite (if any):**	**General Pharmacognosy I**			
16	**Co –requisite (if any):**	**none**			
17	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
18	**Language of teaching the course:**	**ENGLISH**			
19	**Location of teaching the course:**	**IN THE UNIVERSITY**			
20	**Date of Approval**				

III. Course Description:

This course is the complement of a previous course (Pharmacognosy I) and both are designed to provide the student with basic knowledge in medicinal plants as a natural source of drugs. This course deals with botanical origin, morphological, microscopical features and medical uses of flowers, seeds, fruits , herbs and unrecognized plant parts that are evidence-based proved to be used as complementary and alternative medicines. The practical part provide the student with skills to prepare plant samples and perform their morphological and microscopical identification in Pharmacognosy Lab.

هذا المقرر الدراسي هو المكمل لمقرر سابق (علم العقاقير 1) وكلا المقررين مصممان لتزويد الطالب بالمعرفة الأساسية في النباتات الطبية كمصدر طبيعي للأدوية. يتناول هذا المقرر الأصل النباتي والسمات الظاهرية والمجهرية والاستخدامات الطبية للزهور والبذور والفواكه والأعشاب وأجزاء النباتات غير المعرفة والمثبتة على أساس الأدلة والتي ثبت استخدامها كأدوية تكميلية وبديلة. يزود الجانب العملي الطالب بالمهارات اللازمة لإعداد العينات النباتية وإجراء اختبارات التعرف المظهري والمجهري لها في مختبر العقاقير.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

24. Alignment CILOs to PILOs

PILOs		CILOs
A4	Describe analytical methods, principles, design and development techniques	**a1**. Explicit the methods used for detection of active constituents and discovering adulteration of medicinal flowers, seeds, fruits , herbs and unrecognized plant parts.
		a2. Discuss the principles and procedures applied for cultivation, collection and processing of medicinal flowers, seeds, fruits , herbs and unrecognized plant parts. as crude drugs.
A6	Explain the basis of complementary and alternative medicines	**a3.** Identify the botanical origin, morphological and microscopical characteristics of medicinal flowers, seeds, fruits , herbs and unrecognized plant parts..
		a4. Determine the active constituents and therapeutic use of medicinal flowers, seeds, fruits , herbs and unrecognized plant parts.
A10	Describe the pharmacists role in different pharmacy practices.	**a5.** Describe his/her role as pharmacist in identification and evaluation of medicinal plants
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Express with drawings the morphology and key microscopical features of medicinal plants
		b2. Differentiate between medicinal flowers, seeds, fruits , herbs and unrecognized plant parts based on morphological and microscopical features.
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3** Classify active constituents in medicinal flowers, seeds, fruits , herbs and unrecognized plant parts.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b4.** Select standard operation procedures to identify medicinal plants and crude drugs.
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
		c2. Operate the instruments and perform experiments successfully in the laboratory

C3	Screen for drugs from different sources and carry out pharmacy relevant experiments successfully.	**c3.** Screen drugs in medicinal flowers, seeds, fruits , herbs and unrecognized plant parts.
C7	Conduct research and utilize the results in different pharmaceutical fields	**c4 .**Search efficiently for information using documented and electronic sources of information.
		c5 Present and report his/her works correctly using appropriate writing rules and technologies media.
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

1. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explicit the methods used for detection of active constituents and discovering adulteration of medicinal flowers, seeds, fruits , herbs and unrecognized plant parts.	**Active Lecture**	**Written exams**
a2. Discuss the principles and procedures applied for cultivation, collection and processing of medicinal flowers, seeds, fruits , herbs and unrecognized plant parts. as crude drugs.		
a3. Identify the botanical origin, morphological and microscopical characteristics of medicinal flowers, seeds, fruits , herbs and unrecognized plant parts..		
a4. Determine the active constituents and therapeutic use of medicinal flowers, seeds, fruits , herbs and unrecognized plant parts.		
a5. Describe his/her role as pharmacist in		

identification and evaluation of medicinal plants		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Express with drawings the morphology and key microscopical features of medicinal plants	**Active Lecture, laboratory practice**	**Written exam , lab. term work, final practical exam**
b2. Differentiate between medicinal flowers, seeds, fruits , herbs and unrecognized plant parts based on morphological and microscopical features.	**laboratory practice**	**lab. term work, final practical exam**
b4. Select standard operation procedures to identify medicinal plants and crude drugs.		
b3. Classify active constituents in medicinal plants.	**Active Lecture , feed-back learning**	**Written exams quizzes**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term work, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory.		
c3. Prepare plant samples and investigate the morphological and microscopical features in medicinal leaves, barks, roots and rhizomes		
c4 . Search efficiently for information using documented and electronic sources of information.	**Feed-back learning , Group-project**	**Assignments**
c5 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice Feed-back learning**	Lab. term work, final practical exam, Assignments
d2. Demonstrate the skills of time management and self-learning.		
d3. Participate efficiently with his colleagues in a		

team work.		

XXX. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Medicinal flowers**	a1, a2, a3, a4, a5, b1, b3	Study of botanical origin, microscopical features, cultivation, adulteration detection, active constituents and medical uses of the following medicinal flowers : Clove, Chamomile, Pyrethrum, Tilia, Santonica, Lavender and Saffron..	3	6
2	**Medicinal seeds**	a1, a2, a3, a4, a5, b1, b3	Study of botanical origin, microscopical features, active constituents and medical uses of the following medicinal bark seeds: Cardamom, Colchicine , nux vomica, Linseed, Nutmeg, Black and White Mustard, Fenugreek, Clabar and Nigella.	3	6
Mid-term exam				1	2
3	**Medicinal fruits**	a1, a2, a3, a4, a5, b1, b3	Study of botanical origin, microscopical features, active constituents and medical uses of the following medicinal fruits Ammi vinaga, Anise, Fennel, Caraway, Capsicum, star Anise, Coriander, Vanilla	3	6
4	**Medicinal herbs**	a1, a2, a3, a4, a5, b1, b3	Study of botanical origin, microscopical features, active constituents and medical uses of the following medicinal herbs : Ergot, Indian hemp, Chatharanthus, Lobelia, Peppermint, Thyme, Passiflora and Ephedra	2	4
5	**Unrecognized plant drugs**	a1, a2, a3, a4, a5, b1, b3	• Definition , classification, chemical and physical properties • Study of medicinal resin and resin combinations: Colophony, Myrrh, Tolu peru, Tolu Balsam, Oliabanum and Benzoin • Medicinal gums , juices and extracts	2	4
Course Review		a1, a2, a3,	Review of the course topics by discussion	1	

	a4, a5, b1, b3	session.		2
FINAL - EXAM			1	2
TOTAL			16	32
Number of Weeks /and Units Per Semester			16 weeks	5 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Intended Learning Outcomes CILOs
152.	morphology and microscopical investigation of medicinal flowers : clove	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
153.	morphology and microscopical investigation of medicinal flowers : Saffron	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
154.	morphology and microscopical investigation of medicinal seeds cardamom	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
155.	morphology and microscopical investigation of medicinal seeds Black & white mustard	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
156.	morphology and microscopical investigation of medicinal fruits Anise	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
157.	morphology and microscopical investigation of medicinal fruits Fennel	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
158.	morphology and microscopical investigation of medicinal fruits Capsicum	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
159.	morphology and microscopical determination of medicinal herbs : Peppermint	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
160.	morphology and microscopical investigation of medicinal herbs : Thyme	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
161.	investigation of medicinal	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2,

	resin : Myrrh			d3
162.	investigation of medicinal gum	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
Total		**12**	**24 equivalent to 12 credit hours**	
Number of Weeks			**12**	

XXXII. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

X. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to do a search on the pharmaceutical products available in the drug market of one plant drug studied in the course.	c4, c5, d2	4-13	3
2	**Group** : each group of students will be assigned to do search report for adulteration of one crude drug studied in the course.	c4, c5, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b3
		Assignments	7, 12	5	5	c4, c5, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a3, a4, a5, b1, b3
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, a4, a5, b1, b3
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b1, b2, b4, c1, c2, c3, d1, d2, d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	b1, b2, b4, c1, c2, c3, d2
			Total	30	30 %	

XXXIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Michael Heinrich , Joanne Barnes, et al. Fundamentals of Pharmacognosy and Phytotherapy, 2018, Elsevier.

2- Essential References.

Biren Shah and Avinash Seth ·Textbook of Pharmacognosy and Phytochemistry. 2018, Elsevier - Health Sciences Division.

3- Electronic Materials and Web Sites *etc*.

1 - https://annamalaiuniversity.ac.in/studport/download/engg/pharm/resources/BPHARM_2Y_4S_405T_Pharmacognosy%20&%20Phytochemistry-I.pdf
2- https://jru.edu.in/studentcorner/lab-manual/dpharm/1st-year/Pharmacognosy.pdf

XXII. Course Policies:

53.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
54.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
55.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
56.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

General Pharmacognosy II

I. Course Identification and General Information:

1.	Course Title:	General Pharmacognosy II			
2.	Course Code &Number:	PHR322			
3.	Credit hours:	C.H			TOTAL
		Lecture	P.	Tr.	
		2	1	-	3
4.	Study level/ semester at which this course is offered:	*(THIRD) Year – (2nd) semester*			
5.	Pre –requisite (if any):	General Pharmacognosy I			
6.	Co –requisite (if any):	none			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	IN THE UNIVERSITY			
10	Date of Approval	2020			

II. Course Description:

This course is the complement of a previous course (Pharmacognosy I) and both are designed to provide the student with basic knowledge in medicinal plants as a natural source of drugs. This course deals with botanical origin, morphological, microscopical features and medical uses of flowers, seeds, fruits , herbs and unrecognized plant parts that are evidence-based proved to be used as complementary and alternative medicines. The practical part provide the student with skills to prepare plant samples and perform their morphological and microscopical identification in Pharmacognosy Lab.

هذا المقرر الدراسي هو المكمل لمقرر سابق (علم العقاقير 1) وكلا المقررين مصممان لتزويد الطالب بالمعرفة الأساسية في النباتات الطبية كمصدر طبيعي للأدوية. يتناول هذا المقرر الأصل النباتي والسمات الظاهرية والمجهرية والاستخدامات الطبية للزهور والبذور والفواكه والأعشاب وأجزاء النباتات غير المعرفة والمثبتة على أساس الأدلة والتي ثبت استخدامها كأدوية تكميلية وبديلة. يزود الجانب العملي الطالب بالمهارات اللازمة لإعداد العينات النباتية وإجراء اختبارات التعرف المظهري والمجهري لها في مختبر العقاقير.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

25. Alignment CILOs to PILOs

PILOs		CILOs
A4	Describe analytical methods, principles, design and development techniques	**a1**. Explicit the methods used for detection of active constituents and discovering adulteration of medicinal flowers, seeds, fruits , herbs and unrecognized plant parts.
		a2. Discuss the principles and procedures applied for cultivation, collection and processing of medicinal flowers, seeds, fruits , herbs and unrecognized plant parts. as crude drugs.
A6	Explain the basis of complementary and alternative medicines	**a3.** Identify the botanical origin, morphological and microscopical characteristics of medicinal flowers, seeds, fruits , herbs and unrecognized plant parts..
		a4. Determine the active constituents and therapeutic use of medicinal flowers, seeds, fruits , herbs and unrecognized plant parts.
A10	Describe the pharmacists role in different pharmacy practices.	**a5.** Describe his/her role as pharmacist in identification and evaluation of medicinal plants
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Express with drawings the morphology and key microscopical features of medicinal plants
		b2. Differentiate between medicinal flowers, seeds, fruits , herbs and unrecognized plant parts based on morphological and microscopical features.
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3** Classify active constituents in medicinal flowers, seeds, fruits , herbs and unrecognized plant parts.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b4.** Select standard operation procedures to identify medicinal plants and crude drugs.
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
		c2. Operate the instruments and perform

	products.	experiments successfully in the laboratory
C3	Screen for drugs from different sources and carry out pharmacy relevant experiments successfully.	**c3.** Screen drugs in medicinal flowers, seeds, fruits , herbs and unrecognized plant parts.
C7	Conduct research and utilize the results in different pharmaceutical fields	**c4 .**Search efficiently for information using documented and electronic sources of information.
		c5 Present and report his/her works correctly using appropriate writing rules and technologies media.
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explicit the methods used for detection of active constituents and discovering adulteration of medicinal flowers, seeds, fruits , herbs and unrecognized plant parts.	**Active Lecture**	**Written exams**
a2. Discuss the principles and procedures applied for cultivation, collection and processing of medicinal flowers, seeds, fruits , herbs and unrecognized plant parts. as crude drugs.		
a3. Identify the botanical origin, morphological and microscopical characteristics of medicinal flowers, seeds, fruits , herbs and unrecognized plant parts..		
a4. Determine the active constituents and therapeutic use of medicinal flowers, seeds, fruits , herbs and unrecognized plant parts.		

a5. Describe his/her role as pharmacist in identification and evaluation of medicinal plants		
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Express with drawings the morphology and key microscopical features of medicinal plants	**Active Lecture, laboratory practice**	**Written exam , lab. term work, final practical exam**
b2. Differentiate between medicinal flowers, seeds, fruits , herbs and unrecognized plant parts based on morphological and microscopical features.	**laboratory practice**	**lab. term work, final practical exam**
b4. Select standard operation procedures to identify medicinal plants and crude drugs.		
b3. Classify active constituents in medicinal plants.	**Active Lecture , feed-back learning**	**Written exams quizzes**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term work, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory.		
c3. Prepare plant samples and investigate the morphological and microscopical features in medicinal leaves, barks, roots and rhizomes		
c4 . Search efficiently for information using documented and electronic sources of information.	**Feed-back learning , Group-project**	**Assignments**
c5 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice Feed-back learning**	Lab. term work, final practical exam, Assignments
d2. Demonstrate the skills of time management and self-learning.		
d3. Participate efficiently with his colleagues in a team work.		

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Medicinal flowers**	a1, a2, a3, a4, a5, b1, b3	Study of botanical origin, microscopical features, cultivation, adulteration detection, active constituents and medical uses of the following medicinal flowers : Clove, Chamomile, Pyrethrum, Tilia, Santonica, Lavender and Saffron..	3	6
2	**Medicinal seeds**	a1, a2, a3, a4, a5, b1, b3	Study of botanical origin, microscopical features, active constituents and medical uses of the following medicinal bark seeds: Cardamom, Colchicine , nux vomica, Linseed, Nutmeg, Black and White Mustard, Fenugreek, Clabar and Nigella.	3	6
Mid-term exam				1	2
3	**Medicinal fruits**	a1, a2, a3, a4, a5, b1, b3	Study of botanical origin, microscopical features, active constituents and medical uses of the following medicinal fruits Ammi vinaga, Anise, Fennel, Caraway, Capsicum, star Anise, Coriander, Vanilla	3	6
4	**Medicinal herbs**	a1, a2, a3, a4, a5, b1, b3	Study of botanical origin, microscopical features, active constituents and medical uses of the following medicinal herbs : Ergot, Indian hemp, Chatharanthus, Lobelia, Peppermint, Thyme, Passiflora and Ephedra	2	4
5	**Unrecognized plant drugs**	a1, a2, a3, a4, a5, b1, b3	• Definition , classification, chemical and physical properties • Study of medicinal resin and resin combinations: Colophony, Myrrh, Tolu peru, Tolu Balsam, Oliabanum and Benzoin • Medicinal gums , juices and extracts	2	4
Course Review		a1, a2, a3, a4, a5, b1, b3	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2

TOTAL	16	32
Number of Weeks /and Units Per Semester	16 weeks	5 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Intended Learning Outcomes CILOs
1.	morphology and microscopical investigation of medicinal flowers : clove	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
2.	morphology and microscopical investigation of medicinal flowers : Saffron	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
3.	morphology and microscopical investigation of medicinal seeds cardamom	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
4.	morphology and microscopical investigation of medicinal seeds Black & white mustard	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
5.	morphology and microscopical investigation of medicinal fruits Anise	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
6.	morphology and microscopical investigation of medicinal fruits Fennel	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
7.	morphology and microscopical investigation of medicinal fruits Capsicum	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
8.	morphology and microscopical determination of medicinal herbs : Peppermint	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
9.	morphology and microscopical investigation of medicinal herbs : Thyme	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
10.	investigation of medicinal resin : Myrrh	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
11.	investigation of medicinal gum	**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b1, b2, b4, c1, c2, c3, d1, d2, d3
Total		**12**	**24 equivalent to 12 credit hours**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to do a search on the pharmaceutical products available in the drug market of one plant drug studied in the course.	c4, c5, d2	4-13	3
2	**Group** : each group of students will be assigned to do search report for adulteration of one crude drug studied in the course.	c4, c5, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b3
		Assignments	7, 12	5	5	c4, c5, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a3, a4, a5, b1, b3
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, a4, a5, b1, b3
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b1, b2, b4, c1, c2, c3, d1, d2, d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	b1, b2, b4, c1, c2, c3, d2
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Michael Heinrich , Joanne Barnes, et al. Fundamentals of Pharmacognosy and Phytotherapy, 2018, Elsevier.

2- Essential References.

Biren Shah and Avinash Seth ·Textbook of Pharmacognosy and Phytochemistry. 2018, Elsevier - Health Sciences Division.

3- Electronic Materials and Web Sites *etc*.

1 - https://annamalaiuniversity.ac.in/studport/download/engg/pharm/resources/BPHARM_2Y_4S_405T_Pharmacognosy%20&%20Phytochemistry-I.pdf
2- https://jru.edu.in/studentcorner/lab-manual/dpharm/1st-year/Pharmacognosy.pdf

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

MEDICINAL CHEMISTRY II

Course code (**PHR323**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

IV. Course Identification and General Information:

21	**Course Title:**	**MEDICINAL CHEMISTRY II**			
22	**Course Code &Number:**	**PHR323**			
23	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	**3**
24	**Study level/ semester at which this course is offered:**	*(Third) Year – (2nd) semester*			
25	**Pre –requisite (if any):**	**Medicinal chemistry I**			
26	**Co –requisite (if any):**				
27	**Program (s) in which the course is offered:**	**At the university facility**			
28	**Language of teaching the course:**	**ENGLISH**			
29	**Location of teaching the course:**	**IN THE UNIVERSITY**			
30	**Prepared by**				
31	**Date of Approval**				

L: lecturing ; P: practical ; T.: training

II. Course Description:

This course is the second among (Medicinal chemistry) courses which are designed to provide knowledge and skills in chemistry of medicinal agents (drugs). It deals with the physicochemical properties, chemical synthesis, structure activity relationship (SAR), pharmacophore molecules and metabolism of drugs affecting smooth muscles and drug used to treat respiratory, Central nervous systems and gastrointestinal tract. The course is co-requisite with (Pharmacology II) as both deal with the same medicinal agents.

هذا المرر هو الثاني بين مقررات (الكيمياء الدوائية) المصممة لتوفير المعرفة والمهارات في كيمياء الأدوية. يركز هذا المقرر بشكل خاص على الخصائص الفيزيائية والكيميائية والتركيب الكيميائي وعلاقة التأثير بالشكل البنائي (SAR) واستقلاب الأدوية التي تؤثر على العضلات الملساء والأدوية المستخدمة في علاج أمراض الجهاز التنفسي و الجهاز العصبي المركزي و الجهاز الهضمي. هذا المقرر يؤخذ بالتزامن مع مقرر (علم الأدوية 2) حيث يركز كلاهما على نفس الأدوية .

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

3. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & Understanding: Upon successful completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.
A4	Describe analytical methods, principles, design and development techniques	**a2.** Explain the principles of synthesis, purification and metabolic reactions of used to treat respiratory, CNS and GIT disorders.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in chemical synthesis of drugs.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the rules of structure-activity relationship to construct pharmacophore of respiratory, CNS and GIT disorders.
		b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3.** Classify, chemically, the drugs for respiratory, CNS and GIT disorders..
		b4 . Compare between chemically related drugs based on their chemical structure
B3	. Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b5.** Design newer drugs for respiratory, CNS and GIT disorders.

Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4 Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

4. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.	**Lecture-discussion**	**Written exams**
a2. Explain the principles of synthesis, purification and metabolic reactions of d drugs for respiratory, CNS and GIT		

disorders..		
a3. Describe the role of pharmacist in chemical synthesis of drugs.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret the rules of structure-activity relationship to construct pharmacophore of drugs affecting smooth muscles and drug used to treat respiratory, cardiovascular systems and blood disorders.	**Lecture-discussion , feed-back learning**	**Written exams , quizzes**
b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing	**Lecture-discussion**	**Written exams**
b3. Classify, chemically, the drugs for respiratory, CNS and GIT disorders.		
b4 . Compare between chemically related drugs based on their chemical structure		
b5. Design newer drugs for respiratory, CNS and GIT disorders..	**Group-project**	**Assignments**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**Group-project**	**Assignments**
c4 Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in	**laboratory practice,**	**Lab. term works, assignment**

discipline with colleagues.	**group-project**	
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**laboratory practice**	**Lab. term works, final practical exam**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Drugs for respiratory system disorders**	a1, a2,a3 , b1, b2, b3, b4	**Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of** • Drugs for common cold and cough • Drugs for bronchial asthma	2	4
2	**Drugs used for CNS disorders**	a1, a2,a3 , b1, b2, b3, b4	**Chemistry of** Neurotransmitters in CNS	1	2
			Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of Sedatives, hypnotics & anxiolytics	1	2
			Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of Anti-epileptic drugs	1	2
			Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of Drugs used for Parkinsonism	1	2
			Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of Anti-psychotic drugs	1	2
Mid-terms exam				1	2
2	**Drugs used for CNS disorders**	a1, a2,a3 , b1, b2, b3, b4	**Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of** Anti-depressant drugs	1	2
			Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of Narcotic analgesics	1	2

2	**Drugs used for CNS disorders**	a1, a2,a3 , b1, b2, b3, b4	**Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of** Non-narcotic analgesics , NSAIDs	1	2
			Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of General anesthetics General anesthesia, preanesthetic medication	1	2
			Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of Local anesthetics	1	2
3	**GIT drugs**	a1, a2,a3 , b1, b2, b3, b4	**Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of** Drugs for peptic ulcer and hyperacidity	1	2
			Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of Drugs for constipation , Drugs for diarrhea	1	2
FINAL - EXAM				1	2
TOTAL				16	32

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Intended Learning Outcomes CILOs
1.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: CNS drugs **diazepam**	**1**	**2**	c1, c2, d1, d2, d3
2.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: CNS drugs **carbamazepine**	**1**	**2**	c1, c2, d1, d2, d3
3.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: of CNS drugs : **tramadol**	**1**	**2**	c1, c2, d1, d2, d3
4.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: CNS drugs : **Ibuprofen**	**1**	**2**	c1, c2, d1, d2, d3
5.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: CNS drugs : **paracetamol**	**1**	**2**	c1, c2, d1, d2, d3
6.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: GIT drugs: **Ranitidine**	**1**	**2**	c1, c2, d1, d2, d3
7.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: **omeprazole**	**1**	**2**	c1, c2, d1, d2, d3
8.	Synthesis of drugs	**2**	**4**	c1, c2, d1, d2, d3
9.	Purification of drugs.	**2**	**4**	c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	c1, c2, d1, d2, d3
Total		**12**	**24**	

V. Teaching strategies of the course:

Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Group** : each group of students will be assigned to hypothetically design newer drugs form a studied patent drug using SAR principles	b5, c3, c4, d1, d3	8	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1
		Assignments	7, 12	5	5	b5, c3, c4, d1, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2,a3 , b1, b2, b3, b4
3	Final exam (written exam)		16	50	50	a1, a2,a3 , b1, b2, b3, b4
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	c1, c2, d2
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

V Alagarsamy. Textbook of Medicinal Chemistry, volume I & II, 2013, Elsevier

2- Essential References.

Munendra Mohan Varshney & Asif Husain . A textbook of medicinal chemistry. 2015, I.K. International Publishing House Pvt. Limited

3- Electronic Materials and Web Sites *etc*.

1- https://pubs.acs.org/journal/jmcmar
2- https://benthamscience.com/journals/medicinal-chemistry/

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Course Plan (Syllabus) of

MEDICIANL CHEMISTRY II

I. Course Identification and General Information:

1.	Course Title:	MEDICINAL CHEMISTRY II			
2.	Course Code &Number:	PHR323			
3.	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	3
4.	Study level/ semester at which this course is offered:	*(Third) Year – (2nd) semester*			
5.	Pre –requisite (if any):	Medicinal chemistry I			
6.	Co –requisite (if any):				
7.	Program (s) in which the course is offered:	At the university facility			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	IN THE UNIVERSITY			
10	Prepared by				
11	Date of Approval				

L: lecturing ; P: practical ; T.: training

II. Course Description:

This course is the second among (Medicinal chemistry) courses which are designed to provide knowledge and skills in chemistry of medicinal agents (drugs). It deals with the physicochemical properties, chemical synthesis, structure activity relationship (SAR), pharmacophore molecules and metabolism of drugs affecting smooth muscles and drug used to treat respiratory, Central nervous systems and gastrointestinal tract. The course is co-requisite with (Pharmacology II) as both deal with the same medicinal agents.

هذا المرر هو الثاني بين مقررات (الكيمياء الدوائية) المصممة لتوفير المعرفة والمهارات في كيمياء الأدوية. يركز هذا المقرر بشكل خاص على الخصائص الفيزيائية والكيميائية والتركيب الكيميائي وعلاقة التأثير بالشكل البنائي (SAR) واستقلاب الأدوية التي تؤثر على العضلات الملساء والأدوية المستخدمة في علاج أمراض الجهاز التنفسي و الجهاز العصبي المركزي و الجهاز الهضمي. هذا المقرر يؤخذ بالتزامن مع مقرر (علم الأدوية 2) حيث يركز كلاهما على نفس الأدوية .

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & Understanding: Upon successful completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.
A4	Describe analytical methods, principles, design and development techniques	**a2.** Explain the principles of synthesis, purification and metabolic reactions of used to treat respiratory, CNS and GIT disorders.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in chemical synthesis of drugs.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the rules of structure-activity relationship to construct pharmacophore of respiratory, CNS and GIT disorders.
		b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3.** Classify, chemically, the drugs for respiratory, CNS and GIT disorders..
		b4 . Compare between chemically related drugs based on their chemical structure
B3	. Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b5.** Design newer drugs for respiratory, CNS and GIT disorders.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and	**c2.** Operate the instruments and perform experiments successfully in the laboratory

	analysis of materials according to standard guidelines.	
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4 Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.	**Lecture-discussion**	**Written exams**
a2. Explain the principles of synthesis, purification and metabolic reactions of d drugs for respiratory, CNS and GIT disorders..		
a3. Describe the role of pharmacist in chemical synthesis of drugs.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies

b1. Interpret the rules of structure-activity relationship to construct pharmacophore of drugs affecting smooth muscles and drug used to treat respiratory, cardiovascular systems and blood disorders.	**Lecture-discussion , feed-back learning**	**Written exams , quizzes**
b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing	**Lecture-discussion**	**Written exams**
b3. Classify, chemically, the drugs for respiratory, CNS and GIT disorders.		
b4 . Compare between chemically related drugs based on their chemical structure		
b5. Design newer drugs for respiratory, CNS and GIT disorders..	**Group-project**	**Assignments**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**Group-project**	**Assignments**
c4 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Lab. term works, assignment**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**laboratory practice**	**Lab. term works, final practical exam**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Drugs for respiratory system disorders**	a1, a2,a3 , b1, b2, b3, b4	**Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of** • Drugs for common cold and cough • Drugs for bronchial asthma	2	4
2	**Drugs used for CNS disorders**	a1, a2,a3 , b1, b2, b3, b4	**Chemistry of** Neurotransmitters in CNS	1	2
			Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of Sedatives, hypnotics & anxiolytics	1	2
			Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of Anti-epileptic drugs	1	2
			Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of Drugs used for Parkinsonism	1	2
			Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of Anti-psychotic drugs	1	2
Mid-terms exam				1	2
2	**Drugs used for CNS disorders**	a1, a2,a3 , b1, b2, b3, b4	**Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of** Anti-depressant drugs	1	2
			Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of Narcotic analgesics	1	2

2	**Drugs used for CNS disorders**	a1, a2,a3 , b1, b2, b3, b4	**Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of** Non-narcotic analgesics , NSAIDs	1	2
			Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of General anesthetics General anesthesia, preanesthetic medication	1	2
			Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of Local anesthetics	1	2
3	**GIT drugs**	a1, a2,a3 , b1, b2, b3, b4	**Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of** Drugs for peptic ulcer and hyperacidity	1	2
			Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of Drugs for constipation , Drugs for diarrhea	1	2
FINAL - EXAM				1	2
TOTAL				16	32

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Intended Learning Outcomes CILOs
1.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: CNS drugs **diazepam**	**1**	**2**	c1, c2, d1, d2, d3
2.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: CNS drugs **carbamazepine**	**1**	**2**	c1, c2, d1, d2, d3
3.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: of CNS drugs : **tramadol**	**1**	**2**	c1, c2, d1, d2, d3
4.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: CNS drugs : **Ibuprofen**	**1**	**2**	c1, c2, d1, d2, d3
5.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: CNS drugs : **paracetamol**	**1**	**2**	c1, c2, d1, d2, d3
6.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: GIT drugs: **Ranitidine**	**1**	**2**	c1, c2, d1, d2, d3
7.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: **omeprazole**	**1**	**2**	c1, c2, d1, d2, d3
8.	Synthesis of drugs	**2**	**4**	c1, c2, d1, d2, d3
9.	Purification of drugs.	**2**	**4**	c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	c1, c2, d1, d2, d3
Total		**12**	**24**	

V. Teaching strategies of the course:

Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Group** : each group of students will be assigned to hypothetically design newer drugs form a studied patent drug using SAR principles	b5, c3, c4, d1, d3	8	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1
		Assignments	7, 12	5	5	b5, c3, c4, d1, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2,a3 , b1, b2, b3, b4
3	Final exam (written exam)		16	50	50	a1, a2,a3 , b1, b2, b3, b4
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	c1, c2, d2
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

V Alagarsamy. Textbook of Medicinal Chemistry, volume I & II, 2013, Elsevier

2- Essential References.

Munendra Mohan Varshney & Asif Husain . A textbook of medicinal chemistry. 2015, I.K. International Publishing House Pvt. Limited

3- Electronic Materials and Web Sites *etc*.

1 - https://pubs.acs.org/journal/jmcmar
2- https://benthamscience.com/journals/medicinal-chemistry/

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research


Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PHARMACEUTICAL BIOTECHNOLOGY

Course Code (**PHR326**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

V. Course Identification and General Information:

32	**Course Title:**	**PHARMACEUTICAL BIOTECHNOLOGY**			
33	**Course Code &Number:**	**PHR326**			
34	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	-	-	**2**
35	**Study level/ semester at which this course is offered:**	*(3rd) Year – (2nd) semester*			
36	**Pre –requisite (if any):**				
37	**Co –requisite (if any):**	**Co: (Pharmaceutics III)**			
38	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
39	**Language of teaching the course:**	**ENGLISH**			
40	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**			
41	**Prepared by**				
42	**Date of Approval**				

VI. Course Description:

This course deals with the study of applications of biotechnological methods such as recombinant DNA , polymerase chain reaction (PCR) and peptide technologies in pharmacy in particular the use of these techniques in analysis of genes and also the recent production of certain medicines such as monoclonal antibodies and others and their therapeutic uses. Also this course concerns with the study of genetic therapy for complicated diseases (treatment by replacement of the defected genes with normal genes).

يتناول هذا المقرر الدراسي دراسة تطبيقات طرق التكنولوجيا الحيوية مثل الحمض النووي المؤتلف ، وتفاعل البوليميراز المتسلسل (PCR) وتقنيات الببتيدات في الصيدلة ، ولا سيما استخدام هذه التقنيات في تحليل الجينات وكذلك الإنتاج الحديث لبعض الأدوية مثل الأجسام المضادة وحيدة النسيلة وغيرها واستخداماتها العلاجية. كما يهتم هذا المقرر بدراسة العلاج الجيني للأمراض المعقدة (العلاج باستبدال الجينات المعيبة بالجينات السليمة).

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Explain the physicochemical properties of biotechnology drug products.
A3	Explain physicochemical properties of materials and products	**a2**. Explain the approaches and analytical techniques applied in biotechnology relevant to gene analysis and production of biotechnology-drug products.
		a3. Identify the actions, therapeutic uses and adverse effects of biotechnology-drug products.
A4	Describe analytical methods, principles, design and development techniques.	**a4.** Describe the role of pharmacist in developing and employing biotechnology techniques in pharmacy practice.
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1 .** Classify biotechnology drugs.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b2 .** Design a suitable method to extract , isolate and purify DNA and genes from human samples
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1 .**Search efficiently for information using documented and electronic sources of information.
		c2. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		

D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the ability of time management and self-learning.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge& understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the physicochemical properties of biotechnology drug products.	**Active Lecture**	**Written exams**
a3. Identify the actions, therapeutic uses and adverse effects of biotechnology-drug products.		
a4. Describe the role of pharmacist in developing and employing biotechnology techniques in pharmacy practice.		
a2. Explain the approaches and analytical techniques applied in biotechnology relevant to gene analysis and production of biotechnology-drug products.	**Active Lecture, feed-back learning**	**Written exams , quizzes**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 . Classify biotechnology drugs.	**Active Lecture**	**Written exams**
b2 . Design a suitable method to extract , isolate and purify DNA and genes from human samples	**Active Lecture, feed-back learning**	**Written exams, assignment**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to

Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning**	**Assignments**
c2. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the ability of time management and self-learning.	**Feed-back learning**	**Assignments**

XXXI. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to Biotechnology**	a1, a2, a3, a4, b1, b2	• definition & purposes & brief history. • Relation of biotechnology to advancement in intracellular chemistry, molecular biology, rDNA technology, pharmacogenomics and immunopharmacology. • living organisms used in biotechnology	2	4
2	**Techniques of Biotechnology**	a1, a2, a3, a4, b1, b2	• Classification of biotechnology techniques • Principles, equipments,	4	8

			pharmaceutical applications, comparison , advantages and disadvantages of : ○ recombinant DNA (rDNA). ○ Monoclonal antibodies ○ Polymerase chain Reaction (PCR) ○ Nucleotide blockade/antisense ○ Peptide technology		
3	**Analysis of genes**	a1, a2, a3, a4, b1, b2	• DNA isolation and purification • Genetic analysis	1	2
			• MID-TERM EXAM • Post-exam disussion	1	2
4	**biotechnology produced-Drugs**	a1, a2, a3, a4, b1, b2	• Classification of biotechnology drugs • advantage and disadvantages of biotechnology drug products as compared to classical medications • Proteins as the first biotechnology products of biotechnology • Physicochemical properties, Indication, mechanism of action, dose, route of administration, precautions, biotechnology by which is obtained for the following products, : o Anticoagulant drug: Lepirudin (Refludan) ® o Antisense drugs : Fomivirsen sodium (Vitravene), efavirenz (Sustiva)® o Clotting factors : Systemic antihemophilic factors (Kogenate) ® o colony-stimulating factors: granulocyte colony–stimulating factor (Filgrastim)® o Erythropoietins : Epoetin alfa (Epogen, Procrit) ®	6	12

			• Fusion inhibitors: Enfuvirtide (Fuzeon) ® • Growth factor: becaplermin (Regranex) ® • Human growth hormone: ystemic growth hormone (Humatrope, • protropin) ® • Interferons: interferon beta-1b (betaseron), interferon beta-1a (Avonex) ® • Interleukins: Aldesleukin (Proleukin) ® • tissue plasminogen activators: recombinant Alteplase (Activase) ® • Vaccines: hepatitis B vaccine recombinant (Engerix-b) ®, haemophilus B conjugate vaccine (Hibtiter) ®		
Course Review		a1, a2, a3, a4, b1, b2	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	4 Units

XXIII. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

XXIII. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to provide a search-based report on one biotechnology method or one drug produced by biotechnology.	b2, c1, c2, d1	7	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	a2
		Assignments	7, 12	10	10	b2, c1, c2, d1
2	Mid-semester exam (written exam)		7	20	20	a1, a2, a3, a4, b1, b2
3	Final exam of (written exam)		16	60	60	a1, a2, a3, a4, b1, b2
			TOTAL	100	100 %	

XXXIV. Learning Resources:

1- Required Textbook(s) (maximum two).

13. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA: Chapter: Biotechnolohy

2- Essential References.

14. Nagori. Foundation s in pharmaceutical biotechnology
15. R.S. pharmaceutical biotechnology

3- Electronic Materials and Web Sites *etc*.

1. https://slideplayer.com/slide/10556636/
2. https://www.slideshare.net/maha0695kiran/pharmaceutical-biotechnology-197478286

XXIII. Course Policies:	
57.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
58.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
59.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
60.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
61.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
62.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

PHARMACEUTICAL BIOTECHNOLOGY

I. Course Identification and General Information:

1.	Course Title:	PHARMACEUTICAL BIOTECHNOLOGY			
2.	Course Code &Number:	PHR326			
3.	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		2	-	-	**2**
4.	Study level/ semester at which this course is offered:	*(3rd) Year – (2nd) semester*			
5.	Pre –requisite (if any):				
6.	Co –requisite (if any):	Co: (Pharmaceutics III)			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FACILITY			
10	Prepared by				
11	Date of Approval				

II. Course Description:

This course deals with the study of applications of biotechnological methods such as recombinant DNA, polymerase chain reaction (PCR) and peptide technologies in pharmacy in particular the use of these techniques in analysis of genes and also the recent production of certain medicines such as monoclonal antibodies and others and their therapeutic uses. Also, this course concerns with the study of genetic therapy for complicated diseases (treatment by replacement of the defected genes with normal genes).

يتناول هذا المقرر الدراسي دراسة تطبيقات طرق التكنولوجيا الحيوية مثل الحمض النووي المؤتلف ، وتفاعل البوليميراز المتسلسل (PCR) وتقنيات الببتيدات في الصيدلة ، ولا سيما استخدام هذه التقنيات في تحليل الجينات وكذلك الإنتاج الحديث لبعض الأدوية مثل الأجسام المضادة وحيدة النسيلة وغيرها واستخداماتها العلاجية. كما يهتم هذا المقرر بدراسة العلاج الجيني للأمراض المعقدة (العلاج باستبدال الجينات المعيبة بالجينات السليمة).

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1.** Explain the physicochemical properties of biotechnology drug products.
A3	Explain physicochemical properties of materials and products	**a2**. Explain the approaches and analytical techniques applied in biotechnology relevant to gene analysis and production of biotechnology-drug products.
		a3. Identify the actions, therapeutic uses and adverse effects of biotechnology-drug products.
A4	Describe analytical methods, principles, design and development techniques.	**a4.** Describe the role of pharmacist in developing and employing biotechnology techniques in pharmacy practice.
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1 .** Classify biotechnology drugs.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b2 .** Design a suitable method to extract , isolate and purify DNA and genes from human samples
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1 .**Search efficiently for information using documented and electronic sources of information.
		c2. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		

D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the ability of time management and self-learning.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge& understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the physicochemical properties of biotechnology drug products.	**Active Lecture**	**Written exams**
a3. Identify the actions, therapeutic uses and adverse effects of biotechnology-drug products.		
a4. Describe the role of pharmacist in developing and employing biotechnology techniques in pharmacy practice.		
a2. Explain the approaches and analytical techniques applied in biotechnology relevant to gene analysis and production of biotechnology-drug products.	**Active Lecture, feed-back learning**	**Written exams , quizzes**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 . Classify biotechnology drugs.	**Active Lecture**	**Written exams**
b2 . Design a suitable method to extract , isolate and purify DNA and genes from human samples	**Active Lecture, feed-back learning**	**Written exams, assignment**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 .Search efficiently for information using documented and electronic sources of information.	**feed-back learning**	**Assignments**
c2. Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the ability of time management and self-learning.	**Feed-back learning**	**Assignments**

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to Biotechnology**	a1, a2, a3, a4, b1, b2	• definition & purposes & brief history. • Relation of biotechnology to advancement in intracellular chemistry, molecular biology, rDNA technology, pharmacogenomics and immunopharmacology. • living organisms used in biotechnology	2	4
2	**Techniques of Biotechnology**	a1, a2, a3, a4, b1, b2	• Classification of biotechnology techniques • Principles, equipments, pharmaceutical applications, comparison , advantages and	4	8

			disadvantages of : ○ recombinant DNA (rDNA). ○ Monoclonal antibodies ○ Polymerase chain Reaction (PCR) ○ Nucleotide blockade/antisense ○ Peptide technology		
3	**Analysis of genes**	a1, a2, a3, a4, b1, b2	• DNA isolation and purification • Genetic analysis	1	2
			• MID-TERM EXAM • Post-exam disussion	1	2
4	**biotechnology produced-Drugs**	a1, a2, a3, a4, b1, b2	• Classification of biotechnology drugs • advantage and disadvantages of biotechnology drug products as compared to classical medications • Proteins as the first biotechnology products of biotechnology • Physicochemical properties, Indication, mechanism of action, dose, route of administration, precautions, biotechnology by which is obtained for the following products, : ○ Anticoagulant drug: Lepirudin (Refludan) ® ○ Antisense drugs : Fomivirsen sodium (Vitravene), efavirenz (Sustiva)® ○ Clotting factors : Systemic antihemophilic factors (Kogenate) ® ○ colony-stimulating factors: granulocyte colony–stimulating factor (Filgrastim)® ○ Erythropoietins : Epoetin alfa (Epogen, Procrit) ® ○ Fusion inhibitors: Enfuvirtide (Fuzeon) ®	6	12

			• Growth factor: becaplermin (Regranex) ® • Human growth hormone: ystemic growth hormone (Humatrope, • protropin) ® • Interferons: interferon beta-1b (betaseron), interferon beta-1a (Avonex) ® • Interleukins: Aldesleukin (Proleukin) ® • tissue plasminogen activators: recombinant Alteplase (Activase) ® • Vaccines: hepatitis B vaccine recombinant (Engerix-b) ®, haemophilus B conjugate vaccine (Hibtiter) ®		
Course Review		a1, a2, a3, a4, b1, b2	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	4 Units

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to provide a search-based report on one biotechnology method or one drug produced by biotechnology.	b2, c1, c2, d1	7	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	a2
		Assignments	7, 12	10	10	b2, c1, c2, d1
2	Mid-semester exam (written exam)		7	20	20	a1, a2, a3, a4, b1, b2
3	Final exam of (written exam)		16	60	60	a1, a2, a3, a4, b1, b2
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA: Chapter: Biotechnolohy

2- Essential References.

1. Nagori. Foundation s in pharmaceutical biotechnology
2. R.S. pharmaceutical biotechnology

3- Electronic Materials and Web Sites *etc*.

1. https://slideplayer.com/slide/10556636/
2. https://www.slideshare.net/maha0695kiran/pharmaceutical-biotechnology-197478286

XXIV.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Course Specification

PHARMACETCAL MICROBIOLOGY II

VII. Course Identification and General Information:

43	**Course Title:**	**PHARMACETCAL MICROBIOLOGY II**					
44	**Course Code &Number:**	**PHR321**					
45	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
46	**Study level/ semester at which this course is offered:**	*(THIRD) Year – (2ND) semester*					
47	**Pre –requisite (if any):**	• **Pharmaceutical microbiology I**					
48	**Co –requisite (if any):**	**none**					
49	**Program (s) in which the course is offered:**	**All BC programs offered by the university**					
50	**Language of teaching the course:**	**ENGLISH**					
51	**Location of teaching the course:**	**IN THE UNIVERSITY**					
52	**Prepared By:**						
53	**Date of Approval**						

L: lecturing ; Tut: Tutorial , S: seminar ; P: practical ; Tr.: training

VIII. Course Description:

The course deals with the study of pathogenic parasites commonly infecting humans. The study concerns with mode of infections, general characters, morphology, life cycle, pathogenesis, diagnosis, prevention and control of those parasites

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

26. Alignment CILOs to PILOs

No.	PILOs	CILOs
21.	A1	**a1.** Identify and describe the microscopical/morphological features of common pathogenic parasites including protozoa , helminthes and arthropods.
22.		**a2.** Determine life cycle, pathogenicity, diagnosis, management of spread and treatment of common pathogenic parasites.
23.	A2	**a3**. Discuss the principles and technologies of parasitology applied for sampling and diagnosis of common pathogenic parasites infections
24.	B1	**b1.** Differentiate between similar parasites using morphological and microscopical techniques
25.	B2	**b2 .**Classify pathogenic parasites.
26.	B3	**b3.** Relate the severity of parasitic infections to its affecting factors such as immunity.
27.	C1	**c1.**Handleefficiently the tools and chemicals used in parasitology Lab.
28.		**c2.** Operate successfully the instruments used in parasitology Lab.
29.	C2	**c3 .** Perform effectively the experiments and practical tasks in microbiology Lab. including microscopical investigation using standard procedures.
30.	C3	**c4 .**Take the required safety criteria during performing different types of practical and professional pharmacy works
31.	C4	**c5 .**Search efficiently for information using documented and electronic sources of information.
32.		**c6.** Present and report his/her works correctly using appropriate writing rules and technologies media.
33.	D1	**d1.** work successfully in team-work.
34.	D2	**d2.** Show respect to life & behave in discipline during practicing practical and professional works and assignments.
35.	D3	**d3.** Communicate effectively with his/her colleagues.
36.	D4	**d4.** Demonstrate the ability of time management and self-learning.

27. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1	laboratory practice, Lecture	Practical assessment (Lab. attendance, accomplishment, reporting, oral/written exam , practical exam), Written exam , Attendance
a2	Lecture	Written exam , Attendance
a3	Lecture	Written exam , Attendance, quizzes

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1,	Lecture laboratory practice	Written exam , Attendance Practical assessment (Lab. attendance, accomplishment, oral/written exam , practical exam), quizzes
b3	Lecture	Written exam , Attendance

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1, c2, c3, c4	laboratory practice	Practical assessment (Lab. attendance, accomplishment, attitude, practical exam)
c5	feed-back learning, Group-project	Assignments
c6	laboratory practice Feed-back learning	Practical assessment (Lab. attendance, reporting, practical exam) Assignments

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1, d3, d4	**laboratory practice** **Feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam)** **Assignments**
d2	**Lecture , laboratory practice**	**Written exam , Attendance, lab. attitude**

XXXII. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to parasites**	a1, a2, b1, b2, b3, d2	□ Definition & Types of parasite (Ecto, endo ,obligate ,facultative) □ Types of host(Mechanical and biological) and Host parasites relationship □ Effect of parasite on the host (Mechanical effect, effect on cell ,invasion and destruction ,inflammatory reaction to the parasite or production ,competition for host nutrient and toxic effect) □ Types of vector (obligate ,facultative) □ Source of infection (food& drink, soil and water, vector ,direct contact and congenial) □ Mode of infection □ Classification of parasites (protozoa, helminthes , arthropods) classes and example for all class	4	8
2	**Techniques for sampling and detection of parasites -**	a3	□ Type of specimens (urine, stool, blood, etc.) □ Collection, transport and preservation of samples. □ Microscopic examination □ Direct Smear Method	1	2
3	**Protozoa** (introduction + Amoeba)	a1, a2, a3, b1, b2, b3, d2	General characteristic of protozoa(morphology, biological feature, multiplication ,nutrient, and locomotion) □ Classification (amoebae ,ciliate, flagellate, sporozoa) □ Amoebae	1	2

			o Entamobeahistolytica (Morphology ,life cycle, pathogenesis, Diagnosis, prevention and control) o Difference between Entamobeahistolytica and Entamobea. Coli		
MID-TERM EXAM				1	2 2
3	**Protozoa (**Ciliate)		• Bantium coli (Morphology ,life cycle, pathogenesis Diagnosis, prevention and control)	1	2
	Protozoa (intestinal and genital Flagellates)	a1, a2, a3, b1, b2, b3, d2	• Intestinal flagellates: Giardia lamblia (Morphology ,life cycle, pathogenesis ,Diagnosis, prevention and control • Genital : Trichomnasvaginalis Morphology ,life cycle, pathogenesis ,Diagnosis, prevention and control	1	2
	Protozoa (blood Flagellates)	a1, a2, a3, b1, b2, b3, d2	• Leishmanias (Visceral and cutanouse) Morphology ,life cycle, pathogenesis ,Diagnosis, prevention and control) • Trypanosoma (all types Morphology ,life cycle, pathogenesis ,diagnosis, prevention and control	1	2
	Protozoa (Sporozoa)	a1, a2, a3, b1, b2, b3, d2	• Malaria parasites (Plasmodium falciparum, vivax, ovali , malareae) Morphology ,life cycle, pathogenesis ,Diagnosis, prevention and control	1	2
4	**Helminthes**	a1, a2, a3, b1, b2, b3, d2	• Classification of helminthes (common worms (Nematodes), schistosoma, tape worms (Trematodes), filariasis. • Morphology ,life cycle, pathogenesis, Diagnosis, prevention and control of helminthes from each class.	2	4
5	**Arthropods**	a1, a2, a3, b1, b2, b3, d2	• classification, morphology, life cycle, pathogenicity, prevention and treatment	1	2

Course Review	a1, a2, a3, b1, b2, b3, d2	Review of the course topics by discussion session.	1	2
FINAL - EXAM			1	2
TOTAL			16	32
Number of Weeks /and Units Per Semester			16 weeks	5 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
163.	investigation of Enatamopea histolytica& Enatamopea coli	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
164.	investigation of Giardia	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
165.	investigation of Trichomonas	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
166.	investigation of Leishmania	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
167.	investigation of Malaria spp (with preparation of blood smear)	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
168.	investigation of Ascaris&Anchylostoma	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
169.	investigation of Teaniaspp	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
170.	investigation of H. nana	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
171.	investigation of schistosoma	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
172.	investigation of Arthropodes	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
PRACTICAL EXAM		**1**	**2**	
Total		**12**	**24 equivalent to 12 credit hours**	
Number of Weeks			**12**	

XXIV. Teaching strategies of the course:

Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to do a summary report on one of the studied pathogenic parasite.	c5, c6,	4-13	3
2	**Group** : each group of students will be assigned to make a letter of education to community about infection of one of the studied parasite.	c5, c6, d1, d3,	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method	Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Attendance	1 - 15	2	2	a1, a2, a3, , b1, , b2, b3, , , d2
2	Assignments (1 + 2)	4-13, 14	5	5	c5, c6, d1, d3,
3	Quiz 1 + Quiz 2	7, 12	3	3	a3, b1
4	Mid-semester exam of theoretical part (written exam	7	10	10	a1, a2,a3, , b1, ,b2, b3 , d2
5	Final exam of theoretical part (written exam)	17	40	40	a1, a2, a3, , b1, , b2, b3, , , d2
		TOTAL	60	60 %	60

Practical part assessment

No.	Assessment Method	Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Attendance	Weekly	5	5	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
2	Lab. Attitude	weekly	2	2	c4, d1, d3, d4
3	Lab. Accomplishments	weekly	5	5	a1, , b1, ,,c1, c2, c3, c4, c6,
4	Lab. Reporting	weekly	3	3	c6
5	Exam of practice theory (written exam or oral exam)	14	5	5	a1, a2, b1, b1, , b3, ,
6	Practical exam (practical)	14	20	20	a1, , b1, ,,c1, c2, c3, c4, c6,
		Total	40	40 %	

XXXV. Learning Resources:

1- Required Textbook(s) (maximum two).

16. Kayser, Medical Microbiology & parasitology, 2005 Thieme

2- Essential References.

1. Michael j. Cuomo. Diagnosing medical parasites: a public health officers guide to assisting laboratory and medical officers, USAF
2. Chatterjee. Parastology
3. Parija. Text book of medical parastologyW. B. Hugo: pharmaceutical microbiology, 1998, Black well science LTD.

3- Electronic Materials and Web Sites *etc*.

www.en.*wikipedia.org/*

XXV. Course Policies:

63.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
64.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
65.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
66.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Course Plan (Syllabus) of

PHARMACETCAL MICROBIOLOGY II

II. Course Description:

The course deals with the study of pathogenic parasites commonly infecting humans. The study concerns with mode of infections, general characters, morphology, life cycle, pathogenesis, diagnosis, prevention and control of those parasites

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

No.	PILOs	CILOs
1.	A1	**a1.** Identify and describe the microscopical/morphological features of common pathogenic parasites including protozoa , helminthes and arthropods.
2.		**a2.** Determine life cycle, pathogenicity, diagnosis, management of spread and treatment of common pathogenic parasites.
3.	A2	**a3**. Discuss the principles and technologies of parasitology applied for sampling and diagnosis of common pathogenic parasites infections
4.	B1	**b1.** Differentiate between similar parasites using morphological and microscopical techniques
5.	B2	**b2 .**Classify pathogenic parasites.
6.		**b3.** Relate the severity of parasitic infections to its affecting factors such as immunity.
7.	C1	**c1.**Handleefficiently the tools and chemicals used in parasitology Lab.
8.		**c2.** Operate successfully the instruments used in parasitology Lab.
9.	C2	**c3 .** Perform effectively the experiments and practical tasks in microbiology Lab. including microscopical investigation using standard procedures.
10.	C3	**c4 .**Take the required safety criteria during performing different types of practical and professional pharmacy works
11.	C4	**c5 .**Search efficiently for information using documented and electronic sources of information.
12.		**c6.** Present and report his/her works correctly using appropriate writing rules and technologies media.
13.	D1	**d1.** work successfully in team-work.
14.	D2	**d2.** Show respect to life & behave in discipline during practicing practical and professional works and assignments.
15.	D3	**d3.** Communicate effectively with his/her colleagues.
16.	D4	**d4.** Demonstrate the ability of time management and self-learning.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1	laboratory practice, Lecture	Practical assessment (Lab. attendance, accomplishment, reporting, oral/written exam , practical exam), Written exam , Attendance
a2	Lecture	Written exam , Attendance
a3	Lecture	Written exam , Attendance, quizzes

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1,	Lecture laboratory practice	Written exam , Attendance Practical assessment (Lab. attendance, accomplishment, oral/written exam , practical exam), quizzes
b3	Lecture	Written exam , Attendance

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1, c2, c3, c4	laboratory practice	Practical assessment (Lab. attendance, accomplishment, attitude, practical exam)
c5	feed-back learning, Group-project	Assignments

c6	**laboratory practice** **Feed-back learning**	**Practical assessment (Lab. attendance, reporting, practical exam)** **Assignments**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1, d3, d4	**laboratory practice** **Feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam)** **Assignments**
d2	**Lecture , laboratory practice**	**Written exam , Attendance, lab. attitude**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to parasites**	a1, a2, b1, b2, b3, d2	□ definition & Types of parasite (Ecto, endo ,obligate ,facultative) □ Types of host(Mechanical and biological) and Host parasites relationship □ Effect of parasite on the host (Mechanical effect, effect on cell ,invasion and destruction ,inflammatory reaction to the parasite or production ,competition for host nutrient and toxic effect) □ Types of vector (obligate ,facultative) □ Source of infection (food& drink, soil and water, vector ,direct contact and congenial) □ Mode of infection □ Classification of parasites (protozoa, helminthes , arthropods) classes and example for all class	4	8
2	**Techniques for sampling and detection of parasites -**	a3	□ Type of specimens (urine, stool, blood, etc.) □ Collection, transport and preservation of samples. □ Microscopic examination □ Direct Smear Method	1	2
3	**Protozoa** (introduction + Amoeba)	a1, a2, a3, b1, b2, b3, d2	General characteristic of protozoa(morphology, biological feature, multiplication ,nutrient, and locomotion) □ Classification (amoebae ,ciliate, flagellate, sporozoa) □ Amoebae o Entamobeahistolytica (Morphology	1	2

			,life cycle, pathogenesis, Diagnosis, prevention and control) o Difference between Entamobeahistolytica and Entamobea. Coli		
MID-TERM EXAM				1	2 2
3	**Protozoa (**Ciliate)		• Bantium coli (Morphology ,life cycle, pathogenesis Diagnosis, prevention and control)	1	2
	Protozoa (intestinal and genital Flagellates)	a1, a2, a3, b1, b2, b3, d2	• Intestinal flagellates: Giardia lamblia (Morphology ,life cycle, pathogenesis ,Diagnosis, prevention and control • Genital : Trichomnasvaginalis Morphology ,life cycle, pathogenesis ,Diagnosis, prevention and control	1	2
	Protozoa (blood Flagellates)	a1, a2, a3, b1, b2, b3, d2	• Leishmanias (Visceral and cutanouse) Morphology ,life cycle, pathogenesis ,Diagnosis, prevention and control) • Trypanosoma (all types Morphology ,life cycle, pathogenesis ,diagnosis, prevention and control	1	2
	Protozoa (Sporozoa)	a1, a2, a3, b1, b2, b3, d2	• Malaria parasites (Plasmodium falciparum, vivax, ovali , malareae) Morphology ,life cycle, pathogenesis ,Diagnosis, prevention and control	1	2
4	**Helminthes**	a1, a2, a3, b1, b2, b3, d2	• Classification of helminthes (common worms (Nematodes), schistosoma, tape worms (Trematodes), filariasis. • Morphology ,life cycle, pathogenesis, Diagnosis, prevention and control of helminthes from each class.	2	4
5	**Arthropods**	a1, a2, a3, b1, b2, b3, d2	• classification, morphology, life cycle, pathogenicity, prevention and treatment	1	2
Course Review		a1, a2, a3, b1, b2,	Review of the course topics by discussion session.	1	2

	b3, d2			
FINAL - EXAM			1	2
TOTAL			16	32
Number of Weeks /and Units Per Semester			16 weeks	5 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	investigation of Enatamopea histolytica& Enatamopea coli	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
2.	investigation of Giardia	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
3.	investigation of Trichomonas	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
4.	investigation of Leishmania	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
5.	investigation of Malaria spp (with preparation of blood smear)	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
6.	investigation of Ascaris&Anchylostoma	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
7.	investigation of Teaniaspp	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
8.	investigation of H. nana	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
9.	investigation of schistosoma	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
10.	investigation of Arthropodes	**1**	**2**	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
PRACTICAL EXAM		**1**	**2**	
Total		**12**	**24 equivalent to 12 credit hours**	
Number of Weeks			**12**	

V. Teaching strategies of the course:

Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to do a summary report on one of the studied pathogenic parasite.	c5, c6,	4-13	3
2	**Group** : each group of students will be assigned to make a letter of education to community about infection of one of the studied parasite.	c5, c6, d1, d3,	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method	Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Attendance	1 - 15	2	2	a1, a2, a3, , b1, , b2, b3, , , d2
2	Assignments (1 + 2)	4-13, 14	5	5	c5, c6, d1, d3,
3	Quiz 1 + Quiz 2	7, 12	3	3	a3, b1
4	Mid-semester exam of theoretical part (written exam	7	10	10	a1, a2,a3, , b1, ,b2, b3 , d2
5	Final exam of theoretical part (written exam)	17	40	40	a1, a2, a3, , b1, , b2, b3, , , d2
		TOTAL	60	60 %	60

Practical part assessment

No.	Assessment Method	Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Attendance	Weekly	5	5	a1, , b1, ,,c1, c2, c3, c4, c6, d1, d3, d4,
2	Lab. Attitude	weekly	2	2	c4, d1, d3, d4
3	Lab. Accomplishments	weekly	5	5	a1, , b1, ,,c1, c2, c3, c4, c6,
4	Lab. Reporting	weekly	3	3	c6
5	Exam of practice theory (written exam or oral exam)	14	5	5	a1, a2, b1, b1, , b3, ,
6	Practical exam (practical)	14	20	20	a1, , b1, ,,c1, c2, c3, c4, c6,
		Total	40	40 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Kayser, Medical Microbiology & parasitology, 2005 Thieme

2- Essential References.

1. Michael j. Cuomo. Diagnosing medical parasites: a public health officers guide to assisting laboratory and medical officers, USAF
2. Chatterjee. Parastology
3. Parija. Text book of medical parastologyW. B. Hugo: pharmaceutical microbiology, 1998, Black well science LTD.

3- Electronic Materials and Web Sites *etc*.

www.en.*wikipedia.org/*

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PHARMACEUTICS III

Course code (**PHR327**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

IX. Course Identification and General Information:

54	**Course Title:**	**PHARMACEUTICS III**			
55	**Course Code &Number:**	**PHR327**			
56	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	**3**
57	**Study level/ semester at which this course is offered:**	*(3rd) Year – (2nd) semester*			
58	**Pre –requisite (if any):**	**PHR317 (Pharmaceutics II)**			
59	**Co –requisite (if any):**	**None**			
60	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
61	**Language of teaching the course:**	**ENGLISH**			
62	**Location of teaching the course:**	**At the university facility**			
63	**Prepared by**				
64	**Date of Approval**				

L: lecturing ; P: practical ; T.: training

X. Course Description:

This course is the Third and last part of "Pharmaceutics "courses which all are intended to provide the student with knowledge in preformulation, formulation and preparation of pharmaceutical dosage forms in small and large scales. The course concerns mainly with solid dosage forms including powders, granules, tablets and capsules. The course also covers specific type of dosage forms: sterile pharmaceutical products which requires strict aseptic techniques to prevent contamination of the products from pathogens. . The practical part provides the student with skills to prepare those dosage forms in the Pharmaceutics Lab.

هذا المقرر هو الجزء الثالث و الأخير من مقررات "الصيدلانيات" التي تهدف جميعها إلى تزويد الطالب بالمعرفة في دراسات ما قبل الصياغة ، و طرق صياغة وإعداد الأشكال الدوائية في المعمل أو مصنع الأدوية , و بركز المقرر الدراسي بشكل أساسي على الأشكال الدوائية الصلبة بما في ذلك المساحيق والحبيبات والأقراص والكبسولات, و يغطي المقرر أيضًا نوعًا خاصا من الأشكال الدوائية و هي المنتجات الصيدلانية المعقمة التي تتطلب تقنيات صارمة لمنع تلوث المنتجات بمسببات الأمراض, كما يزود الجزء العملي الطالب بالمهارات اللازمة لتحضير تلك الأشكال الدوائية في معمل الصيدلانيات.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

28. Alignment CILOs to PILOs

PILOs		CILOs
A4	Describe analytical methods, principles, design and development techniques	**a1.** Describe the significance of pharmaceutics as art and science of dosage form design
		a2. Explicit the types and roles of excipients included in pharmaceutical solid dosage forms and sterile pharmaceutical products.
		a3. Describe the stages of designing pharmaceutical solid dosage forms and sterile pharmaceutical products..
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the role of pharmacist in formulation of pharmaceutical solid dosage forms and sterile pharmaceutical products.
A11	Identify the properties of dosage forms and novel drug delivery systems.	**a5.** Explicit the general properties, advantages and disadvantages of pharmaceutical solid dosage forms and sterile pharmaceutical products.
		a6. Discuss the principles, pharmacopeial requirements, methods of preparation, of various types of pharmaceutical solid dosage forms and sterile pharmaceutical products.
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1 .** Classify pharmaceutical solid dosage forms and sterile pharmaceutical products.
		b2. Compare between various types of pharmaceutical solid dosage forms and sterile pharmaceutical products.
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b3.** Design pharmaceutical solid dosage forms and sterile pharmaceutical products.
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation,	**c2.** Operate the instruments and perform experiments successfully in the laboratory

	formulation and analysis of materials according to standard guidelines.	
C5	Employ the relevant ways to produce extemporaneous preparations including TPN and IV admixtures.	**c3.** Employ the relevant way to prepare pharmaceutical solid dosage forms and sterile pharmaceutical products..
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c4 .**Search efficiently for information using documented and electronic sources of information.
		c5 Present and report his/her works correctly using appropriate writing rules and technologies media.
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals	**d3.** Participate efficiently with colleagues in a team work.

29. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Describe the significance of pharmaceutics as art and science of dosage form design	**Active Lecture**	**Written exams**
a2. Explicit the types and roles of excipients included in pharmaceutical solid dosage forms and sterile pharmaceutical products..		
a3. Describe the stages of designing of pharmaceutical solid dosage forms and sterile pharmaceutical products.		
a4. Describe the role of pharmacist in formulation of pharmaceutical solid dosage forms and sterile pharmaceutical products..		

a5. Explicit the general properties, advantages and disadvantages of pharmaceutical solid dosage forms and sterile pharmaceutical products.		
a6. Discuss the principles, pharmacopeial requirements, methods of preparation, of various types of solid dosage forms (and sterile pharmaceutical products.		
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 . Classify pharmaceutical solid dosage forms and sterile pharmaceutical products.	**Active Lecture , Feed-back learning**	**Written exams, quizzes**
b2. Compare between various types of pharmaceutical solid dosage forms and sterile pharmaceutical products.		
b3. Design pharmaceutical solid dosage forms and sterile pharmaceutical products.		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3. Employ the relevant way to prepare pharmaceutical solid dosage forms and sterile pharmaceutical products.		
c4 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c5 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Practical assessment (Lab. attendance,**

d3. Participate efficiently with colleagues in a team work		**attitude, practical exam), Assignments**
d2. Demonstrate the skills of time management and self-learning	**Lab. practice, group-project, feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**

IV. Course Content:

A – Theoretical Aspect:

No.	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Solid dosage forms: (1) : Introduction & Powders**	a1, a2, a3, a4, a5, a6, b1, b2, b3	**Introduction** □ classifications of dosage forms □ Advantages and disadvantages □ Formulation consideration **Powders** □ Definitions, advantages, disadvantages □ classification (coarse, fine, microfine, etc; divided, bulk; compounded; medicated, cosmetic) □ Formulation considerations □Bulk powder, divided powder and Dusting powder:: formulation, examples □ Powders packaging □ Quality control evaluation	2	4
2	**Solid dosage forms: (2) Granules**	a1, a2, a3, a4, a5, a6, b1, b2, b3	□ Definition, advantages, disadvantages □ Method of preparation □ Formulation considerations **Effervescent granules** o Definition, composition o Method of preparation: dry (fusion) method, wet method o Determination of the required quantity of effervescent base in the formulation	1	2
3	**Solid dosage forms: (3) Tablets**	a1, a2, a3, a4, a5, a6, b1, b2, b3	□ Advantages and disadvantages. □ Types and Ideal properties of tablets □ Tablet excipients □ Tableting methods Steps, advantages and disadvantages (Direct compression, Dry granulation, Wet granulation) □ Tablet press machines □ Problems encountered during tablet formulation. □ Tablet coating Sugar coating , Film coating, Enteric coating,	5	

			extended release coating : advantages, disadvantages, coating materials, process of coatings □ Quality evaluation		10
Mid-term exam				1	2
4	**Solid dosage forms: (4) Capsules**	a1, a2, a3, a4, a5, a6, b1, b2, b3	**(i) Hard gelatin capsules** • Advantages and disadvantages • Composition of capsule shell • types of capsule fill • Selection of capsule size. • Excipients used in hard gelatin capsule formulation. • Capsule filling process. • Storage of hard gelatin capsules. **(ii) Soft gelatin capsules** • Advantage and disadvantages. • Capsule shell composition. • types of capsule fill • Shapes and sizes. • Soft gelatin capsule formulation. • capsule filling process • specific properties:O2 impermeability, water content	3	6
5	**Sterile pharmaceutical dosage forms** (Introduction)	a1, a2, a3, a4, a5, a6, b1, b2, b3	**Differences between sterile & non-sterile dosage forms :** • Definition : sterility, sterilization, preservation, pyrogenicity, pyrogen-free • Review of sterilization methods and preservation of dosage forms • Aseptic techniques • Sources of contamination and methods of prevention • Design of aseptic area , Laminar flow benches services and maintenance) • Isotonicity of sterile preparations and methods of adjustment	1	2

6	**Sterile pharmaceutical dosage forms** (Parenteral preparations)	a1, a2, a3, a4, a5, a6, b1, b2, b3	• Preformulation factors
			  ○ Route of administration of injection
			  ○ Water for injection
			  ○ Non-aqueous vehicles
			• Formulation consideration
			  ○ Formulation of Infusion fluids
			• Prefilling , filling and package (small and large sacle)
			  ○ Quality evaluation
				2	4

7	**Sterile pharmaceutical dosage forms** (Ophthalmic preparations)	a1, a2, a3, a4, a5, a6, b1, b2, b3	• Anatomical features of the eye • Types of ophthalmic preparations • Formulation considerations • Sterilization and preservation. • Package • Quality evaluation	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
173.	Preparation of tablets using wet granulation method : paracetamol tablets	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
174.	Preparation of tablets using wet granulation method : mefenamic acid tablets	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
175.	Preparation of tablets using direct compression method : aspirin tablets	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
176.	film-coating of tablets mefenamic acid	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
177.	Preparation of hard gelatin capsules (Manual): aspirin	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
178.	Preparation of hard gelatin capsules (Manual): paracetamol	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
179.	Preparation of I.V. admixtures : DNS + vitamin C + vitamin B complex	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
180.	Preparation of parenteral solutions from parenteral powders : reconstitution of cefuroxime sodium vial	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
181.	Preparation of Glycerin suppositories.	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
182.	Preparation of sterile NaCl eye wash.	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b3, c1,c2, c3, d1, d2, d3
Total		**11**	**22**	

XXXV. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XXIV. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to present a search report supported with images on 5 trade names (commercial preparations) of the studied dosage forms	c4, c5, d2	7	
2	**Group** :every group is assigned to present an illustrating videos on lab. And industrial preparation of 3 types of studies dosage forms.	c4, c5, d1, d2, d3	12	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3
		Assignments	7, 12	5	5	c4, c5, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a3, b1
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, a4, a5, a6, b1, b2, b3
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, c3, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	c1, c2, c3, d1, d2, d3
			Total	30	30 %	

XXXVI. Learning Resources

1- Required Textbook(s) (maximum two).

1. Aulton M.E., Pharmaceutics: the science of dosage form design, 2013, Churchill Livingstone, UK
2. Linda Felton. Remington Essentials of Pharmaceutics, 2012, Pharmaceutical press, UK

2- Essential References.

1. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA
2. United states pharmacopeia (USP-41, NF 36), 2018, the United States Pharmacopeial Convention.

3- Electronic Materials and Web Sites *etc*.

http://slideplayer.com/slide/4385584/
http://slideplayer.com/slide/4434636/
http://slideplayer.com/slide/5274453/
http://slideplayer.com/slide/4434619/
http://slideplayer.com/slide/6428232/

XXVI.Course Policies:

67.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
68.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
69.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
70.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

PHARMACEUTICS III

Course code (**PHR327**)

I. Course Identification and General Information:

1.	Course Title:	PHARMACEUTICS III			
2.	Course Code &Number:	PHR327			
3.	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	3
4.	Study level/ semester at which this course is offered:	*(3rd) Year – (1st) semester*			
5.	Pre –requisite (if any):	PHR317 (Pharmaceutics II)			
6.	Co –requisite (if any):	None			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	At the university facility			
10	Prepared by				
11	Date of Approval				

L: lecturing ; P: practical ; T.: training

II. Course Description:

This course is the Third and last part of "Pharmaceutics "courses which all are intended to provide the student with knowledge in preformulation, formulation and preparation of pharmaceutical dosage forms in small and large scales. The course concerns mainly with solid dosage forms including powders, granules, tablets and capsules. The course also covers specific type of dosage forms: sterile pharmaceutical products which requires strict aseptic techniques to prevent contamination of the products from pathogens. . The practical part provides the student with skills to prepare those dosage forms in the Pharmaceutics Lab.

هذا المقرر هو الجزء الثالث و الأخير من مقررات "الصيدلانيات" التي تهدف جميعها إلى تزويد الطالب بالمعرفة في دراسات ما قبل الصياغة ، و طرق صياغة وإعداد الأشكال الدوائية في المعمل أو مصنع الأدوية , و بركز المقرر الدراسي بشكل أساسي على الأشكال الدوائية الصلبة بما في ذلك المساحيق والحبيبات والأقراص والكبسولات, و يغطي المقرر أيضًا نوعًا خاصا من الأشكال الدوائية و هي المنتجات الصيدلانية المعقمة التي تتطلب تقنيات صارمة لمنع تلوث المنتجات بمسببات الأمراض, كما يزود الجزء العملي الطالب بالمهارات اللازمة لتحضير تلك الأشكال الدوائية في معمل الصيدلانيات.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
A4	Describe analytical methods, principles, design and development techniques	**a1.** Describe the significance of pharmaceutics as art and science of dosage form design
		a2. Explicit the types and roles of excipients included in pharmaceutical solid dosage forms and sterile pharmaceutical products.
		a3. Describe the stages of designing pharmaceutical solid dosage forms and sterile pharmaceutical products..
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the role of pharmacist in formulation of pharmaceutical solid dosage forms and sterile pharmaceutical products.
A11	Identify the properties of dosage forms and novel drug delivery systems.	**a5.** Explicit the general properties, advantages and disadvantages of pharmaceutical solid dosage forms and sterile pharmaceutical products.
		a6. Discuss the principles, pharmacopeial requirements, methods of preparation, of various types of pharmaceutical solid dosage forms and sterile pharmaceutical products.
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1 .** Classify pharmaceutical solid dosage forms and sterile pharmaceutical products.
		b2. Compare between various types of pharmaceutical solid dosage forms and sterile pharmaceutical products.
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b3.** Design pharmaceutical solid dosage forms and sterile pharmaceutical products.
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation,	**c2.** Operate the instruments and perform experiments successfully in the laboratory

	formulation and analysis of materials according to standard guidelines.	
C5	Employ the relevant ways to produce extemporaneous preparations including TPN and IV admixtures.	**c3.** Employ the relevant way to prepare pharmaceutical solid dosage forms and sterile pharmaceutical products..
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c4 .**Search efficiently for information using documented and electronic sources of information.
		c5 Present and report his/her works correctly using appropriate writing rules and technologies media.
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals	**d3.** Participate efficiently with colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Describe the significance of pharmaceutics as art and science of dosage form design	**Active Lecture**	**Written exams**
a2. Explicit the types and roles of excipients included in pharmaceutical solid dosage forms and sterile pharmaceutical products..		
a3. Describe the stages of designing of pharmaceutical solid dosage forms and sterile pharmaceutical products.		
a4. Describe the role of pharmacist in formulation of pharmaceutical solid dosage forms and sterile pharmaceutical products..		

a5. Explicit the general properties, advantages and disadvantages of pharmaceutical solid dosage forms and sterile pharmaceutical products.		
a6. Discuss the principles, pharmacopeial requirements, methods of preparation, of various types of solid dosage forms (and sterile pharmaceutical products.		
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 . Classify pharmaceutical solid dosage forms and sterile pharmaceutical products.	**Active Lecture , Feed-back learning**	**Written exams, quizzes**
b2. Compare between various types of pharmaceutical solid dosage forms and sterile pharmaceutical products.		
b3. Design pharmaceutical solid dosage forms and sterile pharmaceutical products.		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3. Employ the relevant way to prepare pharmaceutical solid dosage forms and sterile pharmaceutical products.		
c4 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments**
c5 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Practical assessment (Lab. attendance,**

d3. Participate efficiently with colleagues in a team work		**attitude, practical exam), Assignments**
d2. Demonstrate the skills of time management and self-learning	**Lab. practice, group-project, feed-back learning**	**Practical assessment (Lab. attendance, attitude, practical exam), Assignments**

IV. Course Content:

A – Theoretical Aspect:

No.	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Solid dosage forms: (1) : Introduction & Powders**	a1, a2, a3, a4, a5, a6, b1, b2, b3	**Introduction** □ classifications of dosage forms □ Advantages and disadvantages □ Formulation consideration **Powders** □ Definitions, advantages, disadvantages □ classification (coarse, fine, microfine, etc; divided, bulk; compounded; medicated, cosmetic) □ Formulation considerations □Bulk powder, divided powder and Dusting powder:: formulation, examples □ Powders packaging □ Quality control evaluation	2	4
2	**Solid dosage forms: (2) Granules**	a1, a2, a3, a4, a5, a6, b1, b2, b3	□ Definition, advantages, disadvantages □ Method of preparation □ Formulation considerations **Effervescent granules** o Definition, composition o Method of preparation: dry (fusion) method, wet method o Determination of the required quantity of effervescent base in the formulation	1	2
3	**Solid dosage forms: (3) Tablets**	a1, a2, a3, a4, a5, a6, b1, b2, b3	□ Advantages and disadvantages. □ Types and Ideal properties of tablets □ Tablet excipients □ Tableting methods Steps, advantages and disadvantages (Direct compression, Dry granulation, Wet granulation) □ Tablet press machines □ Problems encountered during tablet formulation. □ Tablet coating Sugar coating , Film coating, Enteric coating,	5	

			extended release coating : advantages, disadvantages, coating materials, process of coatings □ Quality evaluation		10
Mid-term exam				1	2
4	**Solid dosage forms: (4) Capsules**	a1, a2, a3, a4, a5, a6, b1, b2, b3	**(i) Hard gelatin capsules** • Advantages and disadvantages • Composition of capsule shell • types of capsule fill • Selection of capsule size. • Excipients used in hard gelatin capsule formulation. • Capsule filling process. • Storage of hard gelatin capsules. **(ii) Soft gelatin capsules** • Advantage and disadvantages. • Capsule shell composition. • types of capsule fill • Shapes and sizes. • Soft gelatin capsule formulation. • capsule filling process • specific properties:O2 impermeability, water content	3	6
5	**Sterile pharmaceutical dosage forms** (Introduction)	a1, a2, a3, a4, a5, a6, b1, b2, b3	**Differences between sterile & non-sterile dosage forms :** • Definition : sterility, sterilization, preservation, pyrogenicity, pyrogen-free • Review of sterilization methods and preservation of dosage forms • Aseptic techniques • Sources of contamination and methods of prevention • Design of aseptic area , Laminar flow benches services and maintenance) • Isotonicity of sterile preparations and methods of adjustment	1	2

6	**Sterile pharmaceutical dosage forms** (Parenteral preparations)	a1, a2, a3, a4, a5, a6, b1, b2, b3	• Preformulation factors
			  ○ Route of administration of injection
			  ○ Water for injection
			  ○ Non-aqueous vehicles
			• Formulation consideration
			  ○ Formulation of Infusion fluids
			• Prefilling , filling and package (small and large sacle)
			  ○ Quality evaluation
				2	4

7	**Sterile pharmaceutical dosage forms** (Ophthalmic preparations)	a1, a2, a3, a4, a5, a6, b1, b2, b3	• Anatomical features of the eye • Types of ophthalmic preparations • Formulation considerations • Sterilization and preservation. • Package • Quality evaluation	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	Preparation of tablets using wet granulation method : paracetamol tablets	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
2.	Preparation of tablets using wet granulation method : mefenamic acid tablets	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
3.	Preparation of tablets using direct compression method : aspirin tablets	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
4.	film-coating of tablets mefenamic acid	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
5.	Preparation of hard gelatin capsules (Manual): aspirin	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
6.	Preparation of hard gelatin capsules (Manual): paracetamol	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
7.	Preparation of I.V. admixtures : DNS + vitamin C + vitamin B complex	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
8.	Preparation of parenteral solutions from parenteral powders : reconstitution of cefuroxime sodium vial	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
9.	Preparation of Glycerin suppositories.	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
10.	Preparation of sterile NaCl eye wash.	**1**	**2**	b3, c1,c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b3, c1,c2, c3, d1, d2, d3
Total		**11**	**22**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to present a search report supported with images on 5 trade names (commercial preparations) of the studied dosage forms	c4, c5, d2	7	
2	**Group** :every group is assigned to present an illustrating videos on lab. And industrial preparation of 3 types of studies dosage forms.	c4, c5, d1, d2, d3	12	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3
		Assignments	7, 12	5	5	c4, c5, d1, d2, d3
2	Mid-semester exam of theoretical part (written exam		7	10	10	a1, a2, a3, b1
3	Final exam of theoretical part (written exam)		16	50	50	a1, a2, a3, a4, a5, a6, b1, b2, b3
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, c3, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	c1, c2, c3, d1, d2, d3
			Total	30	30 %	

VIII. Learning Resources

1- Required Textbook(s) (maximum two).

1. Aulton M.E., Pharmaceutics: the science of dosage form design, 2013, Churchill Livingstone, UK
2. Linda Felton. Remington Essentials of Pharmaceutics, 2012, Pharmaceutical press, UK

2- Essential References.

1. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA
2. United states pharmacopeia (USP-41, NF 36), 2018, the United States Pharmacopeial Convention.

3- Electronic Materials and Web Sites *etc*.

http://slideplayer.com/slide/4385584/
http://slideplayer.com/slide/4434636/
http://slideplayer.com/slide/5274453/
http://slideplayer.com/slide/4434619/
http://slideplayer.com/slide/6428232/

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

Pharmacology & Therapeutics II

Course No. (**41**)

Course Code (**PHR325**)

2020/2021

This template of course specifications was prepared by CAQA, Yemen, 2017.

XI. Course Identification and General Information:

65	Course Title:	Pharmacology & Therapeutics II			
66	Course Code &Number:	PHR325			
67	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		3	-	-	3
68	Study level/ semester at which this course is offered:	(3RD) Year – (2nd) semester			
69	Pre –requisite (if any):				
70	Co –requisite (if any):	(PHR323) Medicinal chemistry II			
71	Program (s) in which the course is offered:	Pharmacy Bachelor			
72	Language of teaching the course:	ENGLISH			
73	Location of teaching the course:	At the university facility			
74	Date of Approval	2020			

L: lecturing ; P: practical ; T.: training

XII. Course Description:

The course is the second among (Pharmacology & Therapeutics) courses which all intend to provide the students with basic knowledge of the effect of human body on drugs and the mechanisms and influence of drugs on human body. The course covers the study of drugs affecting respiratory system, central nervous system and gastrointestinal tract. The course is co-requested with (Medicinal chemistry II) as both deals with the same drugs.

هذا المقرر الدراسي هي الثاني ضمن مقررات (علم الأدوية و التداوي) و التي تهدف جميعها إلى تزويد الطلاب بالمعرفة الأساسية لتأثير جسم الإنسان على الأدوية وآليات وتأثير الأدوية على جسم الإنسان. يغطي هذا المقرر دراسة الأدوية التي تؤثر على الجهاز التنفسي والجهاز العصبي المركزي والجهاز الهضمي. يؤخذ هذا المقرر بالتزامن مع مقرر (الكيمياء الدوائية 2) حيث يركز كلاهما على نفس الأدوية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

30. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A5	Identify actions of medicines on human body.	**a1.** Identify the actions of medicines in human body, their therapeutic uses, adverse effects drug interactions and interactions
A8	Describe Biopharmaceutics and pharmacokinetics of medicines	**a2.** Describe the pharmacokinetics of drugs.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in providing correct information on rational use of medications.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1 .**Classify drugs affecting respiratory system, central nervous system and gastrointestinal tract..
		b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency)and drug limitations.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1 .** Advise the patient and healthcare professional to optimize medicine use
Transferable skills : Upon successful completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate time management and decision making skills.

31. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the actions of medicines in human body, their therapeutic uses, adverse effects drug interactions and interactions	**Active Lecture**	**Written exams**
a2. Describe the pharmacokinetics of drugs.		
a3. Describe the role of pharmacist in providing correct information on rational use of medications.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 . Classify drugs affecting respiratory system, central nervous system and gastrointestinal tract..	**Active Lecture**	**Written exams**
b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency)and drug limitations.	**Active Lecture , feed-back learning**	**Written exam , quizzes, assignments**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Advise the patient and healthcare professional to optimize medicine use	**feed-back learning**	**assignment**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate time management and decision making skills.	**Feed-back learning**	**Assignments**

XIII. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Respiratory pharmacology**	a1, a2, a3, b1	Drugs for cough Anti-tussives, mucolytics, expectorants	1	3
2	**CNS pharmacology**	a1, a2, a3, b1	Introduction to CNS Neurotransmitters in CNS, receptors, …etc.	1	3
			Sedatives, hypnotics & anxiolytics Benzodiazepines, barbiturates, newer drugs, …etc.	1	3
			Anti-epileptic drugs Phenytoin, carbamazepine, valproic acid, newer drugs	1	3
			Drugs used for Parkinsonism Dopaminergic agonists, central anticholinergic drugs	1	3
			Anti-psychotic drugs Phenothizines, butyrophenones, atypical drugs,	1	3
			Anti-depressant drugs Tricyclic drug, atypical	1	3
			Narcotic analgesics Natural opium alkaloids, synthetic opiates	1	3
			Mid-terms exam	1	3
			Non-narcotic analgesics NSAIDs	1	3
			General anesthetics General anesthesia, preanesthetic medication	1	3
			Local anesthetics , general anesthetic and pre-anesthetic medications	1	3

3	**GIT pharmacology**	a1, a2, a3, b1	Drugs for peptic ulcer and hyperacidity Antacids, H_2 receptor blockers, proton pump inhibitors, …etc.	2	6
			Drugs for constipation , Drugs for diarrhea Anti-diarrheal drugs, rehydration therapy	1	3
FINAL – EXAM				1	3
TOTAL				16	48
Number of Weeks /and Units Per Semester				16 week	3 Units

XXVI. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

XXXV. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to solve a list of problems related to advising healthcare of medicines use based comparison of drug benefits and risks for specific patients e.g. CVS patients, renal failure patients, etc.	b1, c1, d1	6-12	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b2
		Assignments	7, 12	10	10	b1, c1, d1
2	Mid-semester exam (written exam)		7	20	20	a1, a2, a3, b1
3	Final exam (written exam)		16	60	60	a1, a2, a3, b1
			TOTAL	100	100 %	

XXXVII. Learning Resources:

1- Required Textbook(s) (maximum two).

Katzung –Basic and Clinical Pharmacology, (2014), McGraw-Hill

2- Essential References.

Rang, Dale and Ritter. Pharmacology, (2018), Churchill Livingstone.

3- Electronic Materials and Web Sites *etc*.

1- https://www.guidetopharmacology.org/
2- https://www.powershow.com/view4/70aa9b-zmy5o/general_pharmacology_powerpoint_ppt_presentation
3- https://www.powershow.com/viewht/478e07-MGVmN/Basic_Pharmacology_powerpoint_ppt_presentation

XXVII. Course Policies:

71.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
72.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
73.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
74.	**Assignments & Projects:** Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

Pharmacology & Therapeutics II

Course No. (**41**)

Information about Faculty Member Responsible for the Course:							
Name of Faculty Member		**Office Hours**					
Location& Telephone No.		**SAT**	**SUN**	**MON**	**TUE**	**WED**	**THU**
E-mail							

I. Course Identification and General Information:

1.	**Course Title:**	**Pharmacology & Therapeutics II**			
2.	**Course Code &Number:**	**PHR325**			
3.	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		3	-	-	3
4.	**Study level/ semester at which this course is offered:**	*(3RD) Year – (2nd) semester*			
5.	**Pre –requisite (if any):**				
6.	**Co –requisite (if any):**	**(PHR323) Medicinal chemistry II**			
7.	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
8.	**Language of teaching the course:**	**ENGLISH**			
9.	**Location of teaching the course:**	**At the university facility**			
10	**Date of Approval**	**2020**			

II. Course Description:

The course is the second among (Pharmacology & Therapeutics) courses which all intend to provide the students with basic knowledge of the effect of human body on drugs and the mechanisms and influence of drugs on human body. The course covers the study of drugs affecting respiratory system, central nervous system and gastrointestinal tract. The course is co-requested with (Medicinal chemistry II) as both deals with the same drugs.

هذا المقرر الدراسي هي الثاني ضمن مقررات (علم الأدوية و التداوي) و التي تهدف جميعها إلى تزويد الطلاب بالمعرفة الأساسية لتأثير جسم الإنسان على الأدوية وآليات وتأثير الأدوية على جسم الإنسان. يغطي هذا المقرر دراسة الأدوية التي تؤثر على الجهاز التنفسي والجهاز العصبي المركزي والجهاز الهضمي. يؤخذ هذا المقرر بالتزامن مع مقرر (الكيمياء الدوائية 2) حيث يركز كلاهما على نفس الأدوية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge & understanding: Upon successful completion of the course, students will be able to:		
A5	Identify actions of medicines on human body.	**a1.** Identify the actions of medicines in human body, their therapeutic uses, adverse effects drug interactions and interactions
A8	Describe Biopharmaceutics and pharmacokinetics of medicines	**a2.** Describe the pharmacokinetics of drugs.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in providing correct information on rational use of medications.
Intellectual skills : Upon successful completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1 .**Classify drugs affecting respiratory system, central nervous system and gastrointestinal tract..
		b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency)and drug limitations.
Professional & practical skills : Upon successful completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1 .** Advise the patient and healthcare professional to optimize medicine use
Transferable skills : Upon successful completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate time management and decision making skills.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the actions of medicines in human body, their therapeutic uses, adverse effects drug interactions and interactions	**Active Lecture**	**Written exams**
a2. Describe the pharmacokinetics of drugs.		
a3. Describe the role of pharmacist in providing correct information on rational use of medications.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 . Classify drugs affecting respiratory system, central nervous system and gastrointestinal tract..	**Active Lecture**	**Written exams**
b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency)and drug limitations.	**Active Lecture , feed-back learning**	**Written exam , quizzes, assignments**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Advise the patient and healthcare professional to optimize medicine use	**feed-back learning**	**assignment**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate time management and decision making skills.	**Feed-back learning**	**Assignments**

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Respiratory pharmacology**	a1, a2, a3, b1	Drugs for cough Anti-tussives, mucolytics, expectorants	1	3
2	**CNS pharmacology**	a1, a2, a3, b1	Introduction to CNS Neurotransmitters in CNS, receptors, …etc.	1	3
			Sedatives, hypnotics & anxiolytics Benzodiazepines, barbiturates, newer drugs, …etc.	1	3
			Anti-epileptic drugs Phenytoin, carbamazepine, valproic acid, newer drugs	1	3
			Drugs used for Parkinsonism Dopaminergic agonists, central anticholinergic drugs	1	3
			Anti-psychotic drugs Phenothizines, butyrophenones, atypical drugs,	1	3
			Anti-depressant drugs Tricyclic drug, atypical	1	3
			Narcotic analgesics Natural opium alkaloids, synthetic opiates	1	3
			Mid-terms exam	1	3
			Non-narcotic analgesics NSAIDs	1	3
			General anesthetics General anesthesia, preanesthetic medication	1	3
			Local anesthetics , general anesthetic and pre-anesthetic medications	1	3

3	**GIT pharmacology**	a1, a2, a3, b1	Drugs for peptic ulcer and hyperacidity Antacids, H_2 receptor blockers, proton pump inhibitors, …etc.	2	6
			Drugs for constipation , Drugs for diarrhea Anti-diarrheal drugs, rehydration therapy	1	3
FINAL – EXAM				1	3
TOTAL				16	48
Number of Weeks /and Units Per Semester				16 week	3 Units

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to solve a list of problems related to advising healthcare of medicines use based comparison of drug benefits and risks for specific patients e.g. CVS patients, renal failure patients, etc.	b1, c1, d1	6-12	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b2
		Assignments	7, 12	10	10	b1, c1, d1
2	Mid-semester exam (written exam)		7	20	20	a1, a2, a3, b1
3	Final exam (written exam)		16	60	60	a1, a2, a3, b1
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Katzung –Basic and Clinical Pharmacology, (2014), McGraw-Hill

2- Essential References.

Rang, Dale and Ritter. Pharmacology, (2018), Churchill Livingstone.

3- Electronic Materials and Web Sites *etc*.

1- https://www.guidetopharmacology.org/
2- https://www.powershow.com/view4/70aa9b-zmy5o/general_pharmacology_powerpoint_ppt_presentation
3- https://www.powershow.com/viewht/478e07-MGVmN/Basic_Pharmacology_powerpoint_ppt_presentation

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

Biopharmaceutics & Pharmacokinetics I

Course Code (**PHR411**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XIII. Course Identification and General Information:

75	**Course Title:**	**BIOPHARMACEUTICS &PHARMACOKINETICS I**			
76	**Course Code &Number:**	**PHR411**			
77	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	-	-	**2**
78	**Study level/ semester at which this course is offered:**	*(4th) Year – (first) semester*			
79	**Pre –requisite (if any):**	**PHR325 (Pharmacology & Therapeutics II)**			
80	**Co –requisite (if any):**	**NONE**			
81	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
82	**Language of teaching the course:**	**ENGLISH**			
83	**Location of teaching the course:**	**At the university facility**			
84	**Prepared by**				
85	**Date of Approval**				

L: lecturing ;; P: practical ; T.: training

XIV. Course Description:

The course examines the factors that influence medication pharmacokinetics and bioavailability, which can have a significant impact on the medicine's therapeutic efficacy. These aspects include biological factors such as anatomical/physiological, pathological, pharmacological factors such as physicochemical features of the medicine, roles of excipients contained, and dosage form type, as well as the impact of genetic variation and concurrent use of other drugs and foods. The course also covers basic biopharmaceutical information, such as in vitro, ex vivo, and in vivo correlation investigations.

يتناول المقرر العوامل التي تؤثر على الحرائك الدوائية والتوافر البيولوجي ، والتي يمكن أن يكون لها تأثير كبير على الفعالية العلاجية للأدوية .والتي تشمل العوامل التشريحية / الفسيولوجية ، والمرضية ، والعقاقير مثل السمات الفيزيائية والكيميائية للأدوية ، وأدوار السواغات ، ونوع و شكل الجرعة ، بالإضافة إلى تأثير التباين الجيني والاستخدام المتزامن للأدوية والأطعمة الأخرى. يغطي المقرر الدراسي أيضًا المعلومات الصيدلانية الحيوية الأساسية ، مثل تحقيقات الارتباط في المختبر ، وخارج الجسم الحي ، وداخل الجسم الحي.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

32. Alignment CILOs to PILOs

No.	PILOs	CILOs
Knowledge and understanding upon completion of the course, student will be able to:		
A1	**Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body**	**a1.** Show understanding of the influence of human body structure including physiological/anatomical, pathological and genetic characters on drug pharmacokinetics and bioavailability.
A3	**Explain physicochemical properties of materials and products**	**a2.** Explain the physicochemical properties of the drug, excipients , dosage forms, co-administered drugs and food that affect drug pharmacokinetics and bioavailability.
A8	**Describe Biopharmaceutics and pharmacokinetics of medicines**	**a3.** Describe the principles of biopharmaceutics and pharmacokinetics.
		a4. Explain the relationship of drug absorption, distribution and elimination to its bioavailability.
		a5. Define biopharmaceutics , bioavailability and bioequivalence.
		a6. Describe the biopharmaceutical classification system (BCS) of drugs.
A10	**Describe the pharmacists role in different pharmacy practices.**	**a7.** Describe the pharmacist role in assessment and improvement of drug bioavailability.
Intellectual skills upon completion of the course, student will be able to:		
B1	**Collect interpret and assess information and data relevant to pharmacy practice**	**b1.** Interpret figures and graphs of biopharmaceutical studies.
B2	**Classify drugs, approaches and other information relevant**	**b2 .**Classify drugs biopharmaceutically.

	to pharmacy based on scientific classification system.	
Professional and practical upon completion of the course, student will be able to:		
C7	**Conduct research and utilize the results in different pharmaceutical fields.**	**c1** .Search efficiently for information using documented and electronic sources of information.
		c2. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills upon completion of the course, student will be able to:		
D2	**Develop and demonstrate skills of time managements, self-learning and decision making.**	**d1.** Demonstrate the skills of time management and self-learning.

33. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Show understanding of the influence of human body structure including physiological/anatomical, pathological and genetic characters on drug pharmacokinetics and bioavailability.	**Active lecture**	**Written exams**
a2. Explain the physicochemical properties of the drug, excipients , dosage forms, co-administered drugs and food that affect drug pharmacokinetics and bioavailability.		
a3. Describe the principles of biopharmaceutics and pharmacokinetics.		
a5. Define biopharmaceutics , bioavailability and bioequivalence.		
a6. Describe the biopharmaceutical classification system (BCS) of drugs.		

a7. Describe the pharmacist role in assessment and improvement of drug bioavailability.		
a4. Explain the relationship of drug absorption, distribution and elimination to its bioavailability.	**Active lecture, feed-back learning**	**Written exams, quizzes**
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret figures and graphs of biopharmaceutical studies.	**Active lecture**	**Written exams**
b2 . Classify drugs biopharmaceutically.		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Search efficiently for information using documented and electronic sources of information.	**feed-back leaning**	**assignments**
c2. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the skills of time management and self-learning.	**Feed-back learning**	**Assignments**

XXIV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to biopharmaceutics**	a1, a2, a3, a4, a5, a6, a7, b1, b2	• Definition and significance of biopharmaceutics and bioavailability. • relation of biopharmaceutics to other pharmaceutical sciences • correlation between bioavailability & dug efficacy • Expressions of drug bioavailability • factors affecting bioavailability • Introduction to steps for drug bioavailability	1	2
2	**Steps and pharmacokinetic processes involved in drug bioavailability**	a1, a2, a3, a4, a5, a6, a7, b1, b2	**1. Pre-absorption steps (For Non-I.V route)** **Drug Release** Definition, significance , Expression parameters (cumulative % release, drug release rate) • Mechanisms and governing equations : Fick`s law, Higuchi equation, Peppas equation (matrix diffusion, membrane diffusion, Fickian, Non-Fickian, controlled) **Drug dissolution** • Definition, significance , Expression parameters (cumulative % dissolved, dissolution rate), Mechanisms and governing equations : Noyes-Whitney equation	1	2
		a1, a2, a3, a4, a5, a6, a7, b1, b2	**2. Pharmacokinetics processes** **Drug absorption** • Definition, significance • Expression parameters (cumulative % absorbed, absorption rate, absorption rate constant) • Mechanisms and governing equations , properties and examples of drugs	2	4

			absorbed by each mechanism. Passive diffusion (transcellular) : Fick`s law. • Carrier-mediated : Active transport, facilitated diffusion, • Convective (paracellular) transport, ion-pair transport, endocytosis		
		a1, a2, a3, a4, a5, a6, a7, b1, b2	**metabolism (biotransformation)** Definition, significance of , Expression parameters: volume of distribution and related equations (related to blood flow, dose and plasma concentration, Mechanisms (passive diffusion, active transport), steps and sites of distribution • Definition, significance of drug biotransformation, Outcomes (products: active, inactive metabolite) with examples of drugs • Sites of metabolism: presystemic (first-pass effect), hepatic with examples of drugs highly influenced by presystemic metabolism. • Mechanisms (phases Reaction): phase I and phase II: types of reactions, examples of drugs , Affecting factors : Biological Factors , pharmaceutical factors and Exogenous factors **drug excretion** • Definition, significance • Renal excretion : the nephron anatomy • Properties of drugs excreted by the kidneys, Mechanisms: glomerular filtration, active tubular secretion, Tubular reabsorption, Factors affecting each excretion mechanism: biological, pharmaceutical and exogenous factors • Excretion from the liver and other organs and the enterhepatic circulation	2	4
mid-term exam				1	2

3	**Biological factors affecting drug pharmacokinetics and bioavailability**	a1, a2, a3, a4, a5, a6, a7, b1, b2	• Anatomical/Physiological factors affecting drug absorption, distribution metabolism, excretion and bioavailability. • Pathological (Disease) factors affecting drug absorption, distribution metabolism, excretion and bioavailability.biological factors affecting drug metabolism " • Genetic factors affecting drug absorption, distribution metabolism, excretion and bioavailability.	3	6
4	**Pharmaceutical factors affecting drug pharmacokinetics and bioavailability**	a1, a2, a3, a4, a5, a6, a7, b1, b2	• factors affecting related to drug physicochemical properties • factors related to excipients • factors related to formulation (dosage forms) • factors related to manufacturing method.	2	4
5	**Influence of food and co-administered drugs on a drug pharmacokinetics and bioavailability**		• Food drug-interactions&Drug-drug interactions	1	2
6	**Biopharmaceutical studies**	a1, a2, a3, a4, a5, a6, a7, b1, b2	• Biopharmaceutical classification scheme • In vivo studies: Pharmacokinetic and pharmacodynamics Bioavailability study (For a new drug): absolute bioavailability, definition, equation, • Bioequivalence study : relative bioavailability, definition, equation • □ In vitro studies : Drug release and dissolution studies (in fasted and feed state) in fluid simulant to	2	

			that the g.i.t fluid, In vitro Stability of drug in fluid simulant to those of g.i.t, Permeability studies (partition coefficient determination, Ex vivo permeation studies • IVIVC : in vivo in vitro correlation studies		
FINAL - EXAM				1	2
TOTAL				16	32

XXVII. Teaching strategies of the course:

Active lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, home works, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

XVI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to provide electronic-based report on research articles related to biopharmaceutical studies of one drug	c1, c2, d1	4-13	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	a4
		Assignments	7, 12	10	10	c1, c2, d1
2	Mid-semester exam (written exam)		7	20	20	a1, a2, a3, a4, a5, a6, a7, b1, b2
3	Final exam of (written exam)		16	60	60	a1, a2, a3, a4, a5, a6, a7, b1, b2
			TOTAL	100	100 %	

XXXVIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Shargel. Biopharmaceutics and pharmacokinetics, 2012, McGraw Hill Inc

2- Essential References.

Malcolm Rowland. Clinical pharmacokinetics: concepts an applications, 1996, Lippincott's Williams & Wilkins

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/arijabuhaniyeh/pharmacokinetics-biopharmaceutics-introduction
2. https://www.slideshare.net/SURYAKANTVERMA2/biopharmaceutics-mechanisms-of-drug-absorption

XXVIII. Course Policies:	
75.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
76.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
77.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
78.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

BIOPHARMACEUTICS & PHARMACOKINETICS I

I. Course Identification and General Information:

1.	Course Title:	BIOPHARMACEUTICS &PHARMACOKINETICS I			
2.	Course Code &Number:	PHR411			
3.	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		2	-	-	**2**
4.	Study level/ semester at which this course is offered:	*(4th) Year – (first) semester*			
5.	Pre –requisite (if any):	PHR325 (Pharmacology & Therapeutics II)			
6.	Co –requisite (if any):	NONE			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	At the university facility			
10	Prepared by				
11	Date of Approval				

II. Course Description:

The course examines the factors that influence medication pharmacokinetics and bioavailability, which can have a significant impact on the medicine's therapeutic efficacy. These aspects include biological factors such as anatomical/physiological, pathological, pharmacological factors such as physicochemical features of the medicine, roles of excipients contained, and dosage form type, as well as the impact of genetic variation and concurrent use of other drugs and foods. The course also covers basic biopharmaceutical information, such as in vitro, ex vivo, and in vivo correlation investigations.

يتناول المقرر العوامل التي تؤثر على الحرائك الدوائية والتوافر البيولوجي ، والتي يمكن أن يكون لها تأثير كبير على الفعالية العلاجية للأدوية .والتي تشمل العوامل التشريحية / الفسيولوجية ، والمرضية ، والعقاقير مثل السمات الفيزيائية والكيميائية للأدوية ، وأدوار السواغات ، ونوع و شكل الجرعة ، بالإضافة إلى تأثير التباين الجيني والاستخدام المتزامن للأدوية والأطعمة الأخرى. يغطي المقرر الدراسي أيضًا المعلومات الصيدلانية الحيوية الأساسية ، مثل تحقيقات الارتباط في المختبر ، وخارج الجسم الحي ، وداخل الجسم الحي.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

No.	PILOs	CILOs
Knowledge and understanding upon completion of the course, student will be able to:		
A1	**Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body**	**a1.** Show understanding of the influence of human body structure including physiological/anatomical, pathological and genetic characters on drug pharmacokinetics and bioavailability.
A3	**Explain physicochemical properties of materials and products**	**a2.** Explain the physicochemical properties of the drug, excipients , dosage forms, co-administered drugs and food that affect drug pharmacokinetics and bioavailability.
A8	**Describe Biopharmaceutics and pharmacokinetics of medicines**	**a3.** Describe the principles of biopharmaceutics and pharmacokinetics.
		a4. Explain the relationship of drug absorption, distribution and elimination to its bioavailability.
		a5. Define biopharmaceutics , bioavailability and bioequivalence.
		a6. Describe the biopharmaceutical classification system (BCS) of drugs.
A10	**Describe the pharmacists role in different pharmacy practices.**	**a7.** Describe the pharmacist role in assessment and improvement of drug bioavailability.
Intellectual skills upon completion of the course, student will be able to:		
B1	**Collect interpret and assess information and data relevant to pharmacy practice**	**b1.** Interpret figures and graphs of biopharmaceutical studies.
B2	**Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.**	**b2 .**Classify drugs biopharmaceutically.
Professional and practical upon completion of the course, student will be able to:		
C7	**Conduct research and utilize the results in different pharmaceutical**	**c1 .**Search efficiently for information using documented and electronic sources of information.

	fields.	**c2.** Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills upon completion of the course, student will be able to:		
D2	**Develop and demonstrate skills of time managements, self-learning and decision making.**	**d1.** Demonstrate the skills of time management and self-learning.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Show understanding of the influence of human body structure including physiological/anatomical, pathological and genetic characters on drug pharmacokinetics and bioavailability.	**Active lecture**	**Written exams**
a2. Explain the physicochemical properties of the drug, excipients , dosage forms, co-administered drugs and food that affect drug pharmacokinetics and bioavailability.		
a3. Describe the principles of biopharmaceutics and pharmacokinetics.		
a5. Define biopharmaceutics , bioavailability and bioequivalence.		
a6. Describe the biopharmaceutical classification system (BCS) of drugs.		
a7. Describe the pharmacist role in assessment and improvement of drug bioavailability.		
a4. Explain the relationship of drug absorption, distribution and elimination to its bioavailability.	**Active lecture, feed-back learning**	**Written exams, quizzes**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret figures and graphs of biopharmaceutical studies.	**Active lecture**	**Written exams**
b2 . Classify drugs biopharmaceutically.		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Search efficiently for information using documented and electronic sources of information.	**feed-back leaning**	**assignments**
c2. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the skills of time management and self-learning.	**Feed-back learning**	**Assignments**

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to biopharmaceutics**	a1, a2, a3, a4, a5, a6, a7, b1, b2	• Definition and significance of biopharmaceutics and bioavailability. • relation of biopharmaceutics to other pharmaceutical sciences • correlation between bioavailability & dug efficacy • Expressions of drug bioavailability • factors affecting bioavailability • Introduction to steps for drug bioavailability	1	2
2	**Steps and pharmacokinetic processes involved in drug bioavailability**	a1, a2, a3, a4, a5, a6, a7, b1, b2	**3. Pre-absorption steps (For Non-I.V route)** **Drug Release** Definition, significance , Expression parameters (cumulative % release, drug release rate) • Mechanisms and governing equations : Fick`s law, Higuchi equation, Peppas equation (matrix diffusion, membrane diffusion, Fickian, Non-Fickian, controlled) **Drug dissolution** • Definition, significance , Expression parameters (cumulative % dissolved, dissolution rate), Mechanisms and governing equations : Noyes-Whitney equation	1	2
		a1, a2, a3, a4, a5, a6, a7, b1, b2	**4. Pharmacokinetics processes** **Drug absorption** • Definition, significance • Expression parameters (cumulative % absorbed, absorption rate, absorption rate constant) • Mechanisms and governing equations , properties and examples of drugs	2	4

			absorbed by each mechanism. Passive diffusion (transcellular) : Fick`s law. • Carrier-mediated : Active transport, facilitated diffusion, • Convective (paracellular) transport, ion-pair transport, endocytosis		
		a1, a2, a3, a4, a5, a6, a7, b1, b2	**metabolism (biotransformation)** Definition, significance of , Expression parameters: volume of distribution and related equations (related to blood flow, dose and plasma concentration, Mechanisms (passive diffusion, active transport), steps and sites of distribution • Definition, significance of drug biotransformation, Outcomes (products: active, inactive metabolite) with examples of drugs • Sites of metabolism: presystemic (first-pass effect), hepatic with examples of drugs highly influenced by presystemic metabolism. • Mechanisms (phases Reaction): phase I and phase II: types of reactions, examples of drugs , Affecting factors : Biological Factors , pharmaceutical factors and Exogenous factors **drug excretion** • Definition, significance • Renal excretion : the nephron anatomy • Properties of drugs excreted by the kidneys, Mechanisms: glomerular filtration, active tubular secretion, Tubular reabsorption, Factors affecting each excretion mechanism: biological, pharmaceutical and exogenous factors • Excretion from the liver and other organs and the enterhepatic circulation	2	4
mid-term exam				1	2

3	**Biological factors affecting drug pharmacokinetics and bioavailability**	a1, a2, a3, a4, a5, a6, a7, b1, b2	• Anatomical/Physiological factors affecting drug absorption, distribution metabolism, excretion and bioavailability. • Pathological (Disease) factors affecting drug absorption, distribution metabolism, excretion and bioavailability.biological factors affecting drug metabolism " • Genetic factors affecting drug absorption, distribution metabolism, excretion and bioavailability.	3	6
4	**Pharmaceutical factors affecting drug pharmacokinetics and bioavailability**	a1, a2, a3, a4, a5, a6, a7, b1, b2	• factors affecting related to drug physicochemical properties • factors related to excipients • factors related to formulation (dosage forms) • factors related to manufacturing method.	2	4
5	**Influence of food and co-administered drugs on a drug pharmacokinetics and bioavailability**		• Food drug-interactions&Drug-drug interactions	1	2
6	**Biopharmaceutical studies**	a1, a2, a3, a4, a5, a6, a7, b1, b2	• Biopharmaceutical classification scheme • In vivo studies: Pharmacokinetic and pharmacodynamics Bioavailability study (For a new drug): absolute bioavailability, definition, equation, • Bioequivalence study : relative bioavailability, definition, equation • □ In vitro studies : Drug release and dissolution studies (in fasted and feed state) in fluid simulant to	2	

			that the g.i.t fluid, In vitro Stability of drug in fluid simulant to those of g.i.t, Permeability studies (partition coefficient determination, Ex vivo permeation studies • IVIVC : in vivo in vitro correlation studies		
FINAL - EXAM				1	2
TOTAL				16	32

XVIII. Teaching strategies of the course:

Active lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, home works, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

XVII. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to provide electronic-based report on research articles related to biopharmaceutical studies of one drug	c1, c2, d1	4-13	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	a4
		Assignments	7, 12	10	10	c1, c2, d1
2	Mid-semester exam (written exam)		7	20	20	a1, a2, a3, a4, a5, a6, a7, b1, b2
3	Final exam of (written exam)		16	60	60	a1, a2, a3, a4, a5, a6, a7, b1, b2
			TOTAL	100	100 %	

XXXIX. Learning Resources:

1- Required Textbook(s) (maximum two).

Shargel. Biopharmaceutics and pharmacokinetics, 2012, McGraw Hill Inc

2- Essential References.

Malcolm Rowland. Clinical pharmacokinetics: concepts an applications, 1996, Lippincott's Williams & Wilkins

3- Electronic Materials and Web Sites *etc*.

3. https://www.slideshare.net/arijabuhaniyeh/pharmacokinetics-biopharmaceutics-introduction
4. https://www.slideshare.net/SURYAKANTVERMA2/biopharmaceutics-mechanisms-of-drug-absorption

XXIX.Course Policies:	
79.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
80.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
81.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
82.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

COMMUNITY PHARMACY

Course Code (**PHR416**)

XV. Course Identification and General Information:

86	**Course Title:**	**COMMUNITY PHARMACY**			
87	**Course Code &Number:**	**PHR416**			
88	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	**3**
89	**Study level/ semester at which this course is offered:**	*(4th) Year – (1st) semester*			
90	**Pre –requisite (if any):**				
91	**Co –requisite (if any):**	------			
92	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
93	**Language of teaching the course:**	**ENGLISH**			
94	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**			
95	**Prepared by**				
96	**Date of Approval**				

L: lecturing ; P: practical ; T.: training

XVI. Course Description:

This course deals with the role of pharmacist in the “community pharmacy” as providers of pharmaceutical care services, including dispensing of medication and counseling , to patients and as administrators of the pharmacy. The course also provides students the essential knowledge and skills in order to properly recommend safe and effective over the counter (OTC) medications to patients based on benefit: risk evaluation and also to promote drug safety in the community and avoid drug abuse/misuse. The practical part of the course will be conducted at the “Virtual pharmacy” at the faculty facility before training in the actual field at community pharmacies which will be at the end of the semester

يتناول هذا المقرر دور الصيدلي في "صيدليات المجتمع" كمقدم لخدمات الرعاية الصيدلانية، بما في ذلك صرف الأدوية وتقديم المشورة للمرضى وكمسؤول عن إدارة الصيدلية. يوفر المقرر أيضًا للطلاب المعرفة والمهارات الأساسية من أجل اختيار أدوية بدون وصفات للمرضى بشكل صحيح بأدوية آمنة وفعالة بناء على تقييمه لفوائد: مخاطر الدواء على المريض وأيضًا دوره في تعزيز سلامة الأدوية في المجتمع وتجنب أخطاء استخدام / إساءة استخدام الأدوية. الجزء العملي من المقرر سيتم في " الصيدلية الافتراضية" في الكلية و الذي ستوفر فرصة لاكتساب الطالب المهارة في صيدليات المجتمع قبل التدريب في "صيدليات المجتمع " في الحياة الواقعية و الذي سيبدأ في فترة الأجازة بعد انتهاء هذا الفصل

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

34. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A2	Explain the fundamental of social and behavioral sciences.	**a1.** Explain the impact of good behavior of pharmacists on their communication and relationship to patients and healthcare professionals.
A5	Identify actions of medicines on human body.	**a2.** Identify the actions of OTC medications on patients and abuse/misuse of different types of those and other medications.
A9	Define the basis of health policy, Pharmacoeconomics, pharmacoepidemology , pharmaceutical marketing and administration.	**a3**. Define the basis of effective pharmacy administration.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the pharmacist role in community pharmacists to dispense and recommend safe and effective OTC medications to patients.
Intellectual skills: upon completion of the course, students will be able to:		
B5	Plan a modern system for administration of foundations and merge ethics to business in drug marketing.	**b1.** Plan a modern system to effectively administer the “community pharmacy”
B7	Formulate and evaluate patient care plan about rational drug use of medications.	**b2.** Formulate and evaluate a plan of patient need and rational use of OTC medications to improve patient safety and efficacy
Professional and practical skills: upon completion of the course, students will be able to:		
C4	Advice patients and healthcare professionals to optimize medicines use.	**c1.** Advise the patient to optimize medicine use.
C6	Apply administrative and Pharmacoeconomics rules in pharmacy and ethically use marketing skills for drug promotion.	**c2.** Apply rules for effective” pharmacy administration”

Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d4.** Take responsibility for adaption to change needs in pharmacy practice
D5	Retrieve essential references of evidence-based to achieve maximal clinical effectiveness	**d5.** Use essential references of evidence-based practice to achieve maximum safety and efficacy of medicines.

35. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the impact of good behavior of pharmacists on their communication and relationship to patients and healthcare professionals.	**Active Lecture**	**Written exams**
a2. Identify the actions of OTC medications on patients and abuse/misuse of different types of those and other medications.		
a4. Describe the pharmacist role in community pharmacists to dispense and recommend safe and effective OTC medications to patients.		
a3. Define the basis of effective pharmacy administration.	**Virtual lab. Practice**	**Lab. term works, final practical exam**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Plan a modern system to effectively administer the "community pharmacy"	**lab. Practice**	**Lab. term works, final practical exam**
b2. Formulate and evaluate a plan of patient need and rational use of OTC medications to improve patient safety and efficacy	**Active Lecture, feed-back learning**	**Written exams , quizzes, assignments**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Advise the patient to	**lab. Practice**	**Lab. term works, final practical**

optimize medicine use.		**exam**
c2. Apply rules for effective" pharmacy administration"		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**lab. Practice**	**Lab. term works, final practical exam**
d2. Demonstrate the skills of time management and self-learning.		
d3. Participate efficiently with his colleagues in a team work.		
d5. Use essential references of evidence-based practice to achieve maximum safety and efficacy of medicines.		
d4. Take responsibility for adaption to change needs in pharmacy practice	**Feed-back learning**	**Quizzes**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to community pharmacy**	a1, a4, b2	• Brief history • Pharmaceutical care Services offered to patients in community pharmacies • Patient counseling: general rules, response to patients,	2	4
2	**Drug benefit: risk and selection of drugs to specific group of patients**	a1, a4, b2	• Drug benefit: risk ratio • dealing with specific groups of patients: general rules • Selection of medication to pregnant women • Selection of medications for breastfeeding women • Safe drugs and dose for children • Misleading of herbal medications	4	8
3	**Drug information sources**	a1, a4, b2	• Reliable foundations and references drug information sources	1	2
	MID-TERM EXAM			1	2
4	**Introduction to OTC medications**	a1, a2, a4, b2	• Definition • Hoe approve OTC medications • Types of medications (OTC) dispensed without a prescription. • referral to physician	1	2
5	**OTC medications for pain and fever**	a1, a2, a4, b2	• Types of pain • Types of OTC analgesics/antipyretics • Risks • Selection for specific groups of patients	2	4

			• Selection for toothache, headache, musculoskeletal pain, migraine, dysmenorrhea • Selection for fever • List of trade names		
6	**OTC for oral healthcare**	a1, a2, a4, b2	• Definition and types of mouth ulcers • OTC for different types of mouth ulcer • OTC for bad breath	1	2
7	**OTC products for alimentary system: part 1**	a1, a2, a4, b2	Types of OTC, community cases, selection for specific groups of patients and list of trade names for the following cases: • Hyperacidity • Nausea and vomiting • Colic	3	6
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

B - Practical Aspect: The practical sections are carried out in the " Virtual pharmacy Lab"

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
183.	Drug product specification	**1**	**2**	b1, c1, c2, d1, d2, d3, d5
184.	Arrangement and classification of medications in community pharmacy	**2**	**4**	b1, c1, c2, d1, d2, d3, d5
185.	Using " Medscape" application and other reliable sources to search about drug safety and efficacy	**1**	**2**	b1, c1, c2, d1, d2, d3, d5
186.	Patient`s counseling: OTC and community cases for pain fever, mouth ulcer, hyperacidity, vomiting and colic	**2**	**4**	b1, c1, c2, d1, d2, d3, d5
187.	Patient counseling: (role play) How to use specific dosage forms ? eye drops, ear drops, inhalers, effervescent, dermal preparations,	**1**	**2**	b1, c1, c2, d1, d2, d3, d5
188.	Skills of Dispensing of prescriptions : example of written prescriptions	**2**	**4**	b1, c1, c2, d1, d2, d3, d5
189.	Pharmacy administration skills : Documentation & indexing, requisition of medications, ordering and receiving products pharmaceutical agents manufacturers in Yemen	**3**	**6**	b1, c1, c2, d1, d2, d3, d5
PRACTICAL EXAM		**1**	**2**	b1, c1, c2, d1, d2, d3, d5
Total		**12**	**24**	

XXIX. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XXVIII. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to search using Medscape on risj and benefit of of a type OTC medication for one specific case	b2	8	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b2, d4
		Assignments	7, 12	5	5	b2
2	Mid-semester exam (written exam)		7	10	10	a1, a4, b2
3	Final exam (written exam)		16	50	50	a1, a2, a4, b2
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b1, c1, c2, d1, d2, d3, d5
		Accomplishments		5	5	
2	Final exam (practical)		12	20	20	b1, c1, c2, d1, d2, d3, d5
			Total	30	30 %	

XL. Learning Resources:

1- Required Textbook(s) (maximum two).

17. Lillian M Azzopardi. Lecture notes on pharmacy practice, 2010, Pharmaceutical press.Christopher
18. Community pharmacy (Symptoms, Diagnosis and Treatment) 5th Edition - May 27, 2020

2- Essential References.

1. Agarwal. Dispensing and community pharmacy
2. Jain. A text book of professional pharmacy

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/iamkarthika/community-pharmacy-78949878
2. https://www.slideshare.net/sonushanno/community-pharmacy-64829089

XXX. Course Policies:

83.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
84.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
85.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
86.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
87.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
88.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

COMMUNITY PHARMACY

I. Course Identification and General Information:

1.	Course Title:	COMMUNITY PHARMACY			
2.	Course Code &Number:	PHR416			
3.	Credit hours:	C.H			TOTAL
		I.	P.	Tr.	
		2	1	-	3
4.	Study level/ semester at which this course is offered:	*(4th) Year – (1st) semester*			
5.	Pre –requisite (if any):				
6.	Co –requisite (if any):	------			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FACILITY			
10	Prepared by				
11	Date of Approval				

L: lecturing ; P: practical ; T.: training

II. Course Description:

This course deals with the role of pharmacist in the "community pharmacy" as providers of pharmaceutical care services, including dispensing of medication and counseling , to patients and as administrators of the pharmacy. The course also provides students the essential knowledge and skills in order to properly recommend safe and effective over the counter (OTC) medications to patients based on benefit: risk evaluation and also to promote drug safety in the community and avoid drug abuse/misuse. The practical part of the course will be conducted at the "Virtual pharmacy" at the faculty facility before training in the actual field at community pharmacies which will be at the end of the semester

يتناول هذا المقرر دور الصيدلي في "صيدليات المجتمع" كمقدم لخدمات الرعاية الصيدلانية ، بما في ذلك صرف الأدوية وتقديم المشورة للمرضى وكمسؤول عن إدارة الصيدلية. يوفر المقرر أيضًا للطلاب المعرفة والمهارات الأساسية من أجل اختيار أدوية بدون وصفات للمرضى بشكل صحيح بأدوية آمنة وفعالة بناء على تقييمه لفوائد: مخاطر الدواء على المريض وأيضًا دوره في تعزيز سلامة الأدوية في المجتمع وتجنب أخطاء استخدام / إساءة استخدام الأدوية. الجزء العملي من المقرر سيتم في " الصيدلية الافتراضية" في الكلية و الذي ستوفر فرصة لاكتساب الطالب المهارة في صيدليات المجتمع قبل التدريب في "صيدليات المجتمع " في الحياة الواقعية و الذي سيبدأ في فترة الإجازة بعد انتهاء هذا الفصل

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A2	Explain the fundamental of social and behavioral sciences.	**a1.** Explain the impact of good behavior of pharmacists on their communication and relationship to patients and healthcare professionals.
A5	Identify actions of medicines on human body.	**a2.** Identify the actions of OTC medications on patients and abuse/misuse of different types of those and other medications.
A9	Define the basis of health policy, Pharmacoeconomics, pharmacoepidemology , pharmaceutical marketing and administration.	**a3**. Define the basis of effective pharmacy administration.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the pharmacist role in community pharmacists to dispense and recommend safe and effective OTC medications to patients.
Intellectual skills: upon completion of the course, students will be able to:		
B5	Plan a modern system for administration of foundations and merge ethics to business in drug marketing.	**b1.** Plan a modern system to effectively administer the “community pharmacy”
B7	Formulate and evaluate patient care plan about rational drug use of medications.	**b2.** Formulate and evaluate a plan of patient need and rational use of OTC medications to improve patient safety and efficacy
Professional and practical skills: upon completion of the course, students will be able to:		
C4	Advice patients and healthcare professionals to optimize medicines use.	**c1.** Advise the patient to optimize medicine use.
C6	Apply administrative and Pharmacoeconomics rules in pharmacy and ethically use marketing skills for drug promotion.	**c2.** Apply rules for effective” pharmacy administration”

Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d4.** Take responsibility for adaption to change needs in pharmacy practice
D5	Retrieve essential references of evidence-based to achieve maximal clinical effectiveness	**d5.** Use essential references of evidence-based practice to achieve maximum safety and efficacy of medicines.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the impact of good behavior of pharmacists on their communication and relationship to patients and healthcare professionals.	**Active Lecture**	**Written exams**
a2. Identify the actions of OTC medications on patients and abuse/misuse of different types of those and other medications.		

a4. Describe the pharmacist role in community pharmacists to dispense and recommend safe and effective OTC medications to patients.		
a3. Define the basis of effective pharmacy administration.	**Virtual lab. Practice**	**Lab. term works, final practical exam**
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Plan a modern system to effectively administer the "community pharmacy"	**lab. Practice**	**Lab. term works, final practical exam**
b2. Formulate and evaluate a plan of patient need and rational use of OTC medications to improve patient safety and efficacy	**Active Lecture, feed-back learning**	**Written exams , quizzes, assignments**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Advise the patient to optimize medicine use.	**lab. Practice**	**Lab. term works, final practical exam**
c2. Apply rules for effective" pharmacy administration"		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**lab. Practice**	**Lab. term works, final practical exam**
d2. Demonstrate the skills of time management and self-learning.		
d3. Participate efficiently with his		

colleagues in a team work.		
d5. Use essential references of evidence-based practice to achieve maximum safety and efficacy of medicines.		
d4. Take responsibility for adaption to change needs in pharmacy practice	**Feed-back learning**	**Quizzes**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to community pharmacy**	a1, a4, b2	• Brief history • Pharmaceutical care Services offered to patients in community pharmacies • Patient counseling: general rules, response to patients,	2	4
2	**Drug benefit: risk and selection of drugs to specific group of patients**	a1, a4, b2	• Drug benefit: risk ratio • dealing with specific groups of patients: general rules • Selection of medication to pregnant women • Selection of medications for breastfeeding women • Safe drugs and dose for children • Misleading of herbal medications	4	8
3	**Drug information sources**	a1, a4, b2	• Reliable foundations and references drug information sources	1	2
	MID-TERM EXAM			1	2

4	**Introduction to OTC medications**	a1, a2, a4, b2	• Definition • Hoe approve OTC medications • Types of medications (OTC) dispensed without a prescription. • referral to physician	1	2
5	**OTC medications for pain and fever**	a1, a2, a4, b2	• Types of pain • Types of OTC analgesics/antipyretics • Risks • Selection for specific groups of patients • Selection for toothache, headache, musculoskeletal pain, migraine, dysmenorrhea • Selection for fever • List of trade names	2	4
6	**OTC for oral healthcare**	a1, a2, a4, b2	• Definition and types of mouth ulcers • OTC for different types of mouth ulcer • OTC for bad breath	1	2
7	**OTC products for alimentary system: part 1**	a1, a2, a4, b2	Types of OTC, community cases, selection for specific groups of patients and list of trade names for the following cases: • Hyperacidity • Nausea and vomiting • Colic	3	6
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

B - Practical Aspect: The practical sections are carried out in the " Virtual pharmacy Lab"

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	Drug product specification	**1**	**2**	b1, c1, c2, d1, d2, d3, d5
2.	Arrangement and classification of medications in community pharmacy	**2**	**4**	b1, c1, c2, d1, d2, d3, d5
3.	Using " Medscape" application and other reliable sources to search about drug safety and efficacy	**1**	**2**	b1, c1, c2, d1, d2, d3, d5
4.	Patient`s counseling: OTC and community cases for pain fever, mouth ulcer, hyperacidity, vomiting and colic	**2**	**4**	b1, c1, c2, d1, d2, d3, d5
5.	Patient counseling: (role play) How to use specific dosage forms ? eye drops, ear drops, inhalers, effervescent, dermal preparations,	**1**	**2**	b1, c1, c2, d1, d2, d3, d5
6.	Skills of Dispensing of prescriptions : example of written prescriptions	**2**	**4**	b1, c1, c2, d1, d2, d3, d5
7.	Pharmacy administration skills : Documentation & indexing, requisition of medications, ordering and receiving products pharmaceutical agents manufacturers in Yemen	**3**	**6**	b1, c1, c2, d1, d2, d3, d5
PRACTICAL EXAM		**1**	**2**	b1, c1, c2, d1, d2, d3, d5
Total		**12**	**24**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to search using Medscape on risj and benefit of of a type OTC medication for one specific case	b2	8	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b2, d4
		Assignments	7, 12	5	5	b2
2	Mid-semester exam (written exam)		7	10	10	a1, a4, b2
3	Final exam (written exam)		16	50	50	a1, a2, a4, b2
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b1, c1, c2, d1, d2, d3, d5
		Accomplishments		5	5	
2	Final exam (practical)		12	20	20	b1, c1, c2, d1, d2, d3, d5
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Lillian M Azzopardi. Lecture notes on pharmacy practice, 2010, Pharmaceutical press.Christopher
2. Community pharmacy (Symptoms, Diagnosis and Treatment) 5th Edition - May 27, 2020

2- Essential References.

1. Agarwal. Dispensing and community pharmacy
2. Jain. A text book of professional pharmacy

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/iamkarthika/community-pharmacy-78949878
2. https://www.slideshare.net/sonushanno/community-pharmacy-64829089

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

Cosmetics

Course Code (**PHR417**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XVII. Course Identification and General Information:

97.	**Course Title:**	**COSMETIC PREPARATIONS**			
98.	**Course Code &Number:**	**PHR417**			
99.	**Credit hours:**	C.H			TOTAL
		L.	P.	T.	
		2	1	-	**3**
100	**Study level/ semester at which this course is offered:**	*(4th) Year – (1st) semester*			
101	**Pre –requisite (if any):**				
102	**Co –requisite (if any):**	**None**			
103	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
104	**Language of teaching the course:**	**ENGLISH**			
105	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**			
106	**Prepared by**				
107	**Date of Approval**				

L: lecturing ; P: practical ; T.: training

XVIII. Course Description:

This course provide concerns with cosmetic preparations which is one of the newer disciplines in pharmacy education. The course is designed to provide knowledge and skills necessary for preparation of cosmetics used in cleaning , perfuming, making-up and cosmetics used as anti-wrinkles and for treatment of skin-pigmentation disorders other purposes. The practical part of the course provides with skills of preparation of cosmetics in pharmaceutics lab.

يهتم هذا المقرر بدراسة (مستحضرات التجميل) التي تعد من المجالات الحديثة غي مهنة الصيدلة و قد تم تصميم المقرر لتوفير المعرفة والمهارات اللازمة للطلاب في إعداد مستحضرات التجميل المستخدمة في التنظيف والتعطير والماكياج و أيضا المستخدمة في علاج التجاعيد و اضطرابات تصبغ الجلد و الأغراض أخرى. يوفر الجزء العملي من الدورة مهارات تحضير مستحضرات التجميل في معمل الصيدلانيات.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

36. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Explicit the general properties, advantages , disadvantages and requirements of cosmetics and cosmeceuticals,
		a2. Discuss the principles, methods of preparation of various types of cosmetic preparations
A10	Describe the pharmacists role in different pharmacy practices.	**A3.** Describe the role of pharmacist in formulation of cosmetic preparations. .
A11	Identify the properties of dosage forms and novel drug delivery systems.	**a4**. Identify the types of cosmetic preparations
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify cosmetic preparations according to their use and physical form.
		b2 . Compare between various types of cosmetic preparations. .
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b3.** Design cosmetic preparations
		b4. Evaluate the quality of the prepared cosmetic preparations.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b5.**. Select appropriate standard operation procedures for preparation and analysis of cosmetic products.
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b6 .** Calculate the amount of ingredient required to prepare an enlarged or reduced amount of a cosmetic preparation. ..
Professional and practical skills: upon completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory

C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C3	Screen for drugs from different sources and carry out pharmacy relevant experiments successfully.	**c3.** Employ the relevant way to prepare cosmetic preparations
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c4 .**Search efficiently for information using documented and electronic sources of information.
		c5 Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

37. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explicit the general properties, advantages , disadvantages and requirements of cosmetics and cosmeceuticals,	**Active Lecture**	**Written exams**
a2. Discuss the principles, methods of preparation of various types of cosmetic preparations		
A3. Describe the role of pharmacist in formulation of cosmetic preparations. .		
a4. Identify the types of cosmetic preparations		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify cosmetic preparations according to their use and physical form.	**Active Lecture**	**Written exams**
b2 . Compare between various types of cosmetic preparations. .		
b3. Design cosmetic preparations	**Feed-back learning**	**Quizzes**
b4. Evaluate the quality of the prepared cosmetic preparations.	**laboratory practice**	**Lab, term works, final practical exam**
b5.. Select appropriate standard operation procedures for preparation and analysis of cosmetic products.		
b6 . Calculate the amount of ingredient required to prepare an enlarged or reduced amount of a	**Active Lecture, Lab. Practice**	**Written exams , Lab, term works, final practical exam**

cosmetic preparation. ..		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab, term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3. Employ the relevant way to prepare cosmetic preparations		
c4 . Search efficiently for information using documented and electronic sources of information.	**Feed-back learning, Group-project**	**Assignments**
c5 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, Feed-back learning, group project**	**Lab, term works, final practical exam, Assignments**
d2. Demonstrate the skills of time management and self-learning.		
d3. Participate efficiently with his colleagues in a team work.		

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, a2, a3, a4, b2, b3, b6	• definitions (cosmetic preparations, cosmeceuticals) • requirements cosmetics preparations registration, • Pharmaceutical classification of cosmetic preparations o cosmetic solutions and oils o cosmetic suspensions and foams o Cosmetic emulsions o Cosmetics solids and semisolids	1	2
2	**Skin-care cosmetic products**	a1, a2, a3, a4, b2, b3, b6	agents, formulations, method of preparations, examples of : a) Anti-wrinkle or anti-aging products including face-masks b) Demulcents and moisturizing products c) Anti-acne products d) Skin- tanning products e) Skin-whitening products f) Hygienic and baby care products	3	6
3	**Make-up and removing make-up products:**	a1, a2, a3, a4, b2, b3, b6	agents, formulations, method of preparations**:** a) Lipsticks b) pencils c) Make up powder d) Make up removing products	2	4
Mid-term exam				1	2
4	**Bath and cleansing products**	a1, a2, a3, a4, b2, b3, b6	agents, formulations, method of preparations**:**	1	2

			a) Shampoos **b)** Soaps		
5	• **Hair care products**	a1, a2, a3, a4, b2, b3, b6	agents, formulations, method of preparations**:** a) hair tints (coloring) and bleaches (discoloring), b) conditioning products for waving, straightening and fixing, c) Depilatories (hair removals). d) hair cleansing products (lotions, powders, shampoo) **e)** Shaving products (creams, foams, lotions, etc.).	2	4
	Pleasantly Odorants	a1, a2, a3, a4, b2, b3, b6	agents, formulations, method of preparations**:** a) Perfumes b) toilet waters c) eau de Colog.	2	4
	Oral and dental hygiene products	a1, a2, a3, a4, b2, b3, b6	agents, formulations, method of preparations**:** a) Toothpaste b) Mouthwashes **c)** Dental gels	2	4
Course Review		a1, a2, a3, a4, b2, b3, b6	Review of the course topics by discussion session.	1	2
FINAL – EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	5 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
190.	Introduction to lab: list of experiments, how to report, etc	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
191.	preparation of anti-aging skin creams, ant-acne dermatological form.	**2**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
192.	preparation of lipsticks	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
193.	preparation of antiseptic soap	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
194.	preparation of antidandruff shampoo	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
195.	preparation of hair nutrient oil	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
196.	preparation of after-shaving product	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
197.	preparation of perfumes	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
198.	preparation of toothpaste	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
199.	preparation of dental gel	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
Total		**11**	**22**	

XL. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feedq-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XXIX. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to present a search report supported with images on 5 trade names (commercial preparations) of the studied cosmetic preparations	c4, c5, d2	4-13	3
2	**Group** :every group is assigned to present an illustrating videos on lab. And industrial preparation of 3 types of cosmetic preparations	c4, c5, d1, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b3
		Assignments	7, 12	5	5	c4, c5, d1, d2, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2, a3, a4, a5, b1, b2, b3, b6
3	Final exam (written exam)		16	50	50	a1, a2, a3, a4, a5, b1, b2, b3, b6
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b4, b5, b6, c1, c2, c3, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	b4, b5, b6, c1, c2, c3, d1, d2, d3
			Total	30	30 %	

VIII. Learning Resources

1- Required Textbook(s) (maximum two).

1. Ernest W. Flick. Cosmetic and toiletry formulations, 1996, Noyes Publications

2- Essential References.

Aulton M.E., Pharmaceutics: the science of dosage form design, 2002, Churchill Livingstone, UK

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/prashantlpingale/introduction-to-cosmetics-138603089
2. https://www.slideshare.net/bknanjwade/cosmetic-products

XXXI.Course Policies:

89.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
90.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
91.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
92.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
93.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
94.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

COSMETICS

I. Course Identification and General Information:

1.	Course Title:	COSMETIC PREPARATIONS			
2.	Course Code &Number:	PHR417			
3.	Credit hours:	C.H			TOTAL
		L.	P.	T.	
		2	1	-	3
4.	Study level/ semester at which this course is offered:	*(4th) Year – (1st) semester*			
5.	Pre –requisite (if any):				
6.	Co –requisite (if any):	None			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FACILITY			
10.	Prepared by				
11.	Date of Approval				

L: lecturing ; P: practical ; T.: training

I. Course Description:

This course provide concerns with cosmetic preparations which is one of the newer disciplines in pharmacy education. The course is designed to provide knowledge and skills necessary for preparation of cosmetics used in cleaning , perfuming, making-up and cosmetics used as anti-wrinkles and for treatment of skin-pigmentation disorders other purposes. The practical part of the course provides with skills of preparation of cosmetics in pharmaceutics lab.

يهتم هذا المقرر بدراسة (مستحضرات التجميل) التي تعد من المجالات الحديثة غي مهنة الصيدلة و قد تم تصميم المقرر لتوفير المعرفة والمهارات اللازمة للطلاب في إعداد مستحضرات التجميل المستخدمة في التنظيف والتعطير والماكياج و أيضا المستخدمة في علاج التجاعيد و اضطرابات تصبغ الجلد و الأغراض أخرى. يوفر الجزء العملي من الدورة مهارات تحضير مستحضرات التجميل في معمل الصيدلانيات.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Explicit the general properties, advantages , disadvantages and requirements of cosmetics and cosmeceuticals,
		a2. Discuss the principles, methods of preparation of various types of cosmetic preparations
A10	Describe the pharmacists role in different pharmacy practices.	**A3.** Describe the role of pharmacist in formulation of cosmetic preparations. .
A11	Identify the properties of dosage forms and novel drug delivery systems.	**a4**. Identify the types of cosmetic preparations
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify cosmetic preparations according to their use and physical form.
		b2 . Compare between various types of cosmetic preparations. .
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b3.** Design cosmetic preparations
		b4. Evaluate the quality of the prepared cosmetic preparations.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b5.**. Select appropriate standard operation procedures for preparation and analysis of cosmetic products.
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b6 .** Calculate the amount of ingredient required to prepare an enlarged or reduced amount of a cosmetic preparation. ..
Professional and practical skills: upon completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory

C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C3	Screen for drugs from different sources and carry out pharmacy relevant experiments successfully.	**c3.** Employ the relevant way to prepare cosmetic preparations
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c4 .**Search efficiently for information using documented and electronic sources of information.
		c5 Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explicit the general properties, advantages , disadvantages and requirements of cosmetics and cosmeceuticals,	**Active Lecture**	**Written exams**
a2. Discuss the principles, methods of preparation of various types of cosmetic preparations		
A3. Describe the role of pharmacist in		

formulation of cosmetic preparations. .		
a4. Identify the types of cosmetic preparations		
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify cosmetic preparations according to their use and physical form.	**Active Lecture**	**Written exams**
b2 . Compare between various types of cosmetic preparations. .		
b3. Design cosmetic preparations	**Feed-back learning**	**Quizzes**
b4. Evaluate the quality of the prepared cosmetic preparations.	**laboratory practice**	**Lab, term works, final practical exam**
b5.. Select appropriate standard operation procedures for preparation and analysis of cosmetic products.		
b6 . Calculate the amount of ingredient required to prepare an enlarged or reduced amount of a cosmetic preparation. ..	**Active Lecture, Lab. Practice**	**Written exams , Lab, term works, final practical exam**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab, term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3. Employ the relevant way to prepare cosmetic preparations		
c4 . Search efficiently for information using documented and electronic sources of information.	**Feed-back learning, Group-project**	**Assignments**
c5 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, Feed-back learning, group project**	**Lab, term works, final practical exam, Assignments**
d2. Demonstrate the skills of time management and self-learning.		
d3. Participate efficiently with his colleagues in a team work.		

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, a2, a3, a4, b2, b3, b6	• definitions (cosmetic preparations, cosmeceuticals) • requirements cosmetics preparations registration, • Pharmaceutical classification of cosmetic preparations o cosmetic solutions and oils o cosmetic suspensions and foams o Cosmetic emulsions o Cosmetics solids and semisolids	1	2
2	**Skin-care cosmetic products**	a1, a2, a3, a4, b2, b3, b6	agents, formulations, method of preparations, examples of : a) Anti-wrinkle or anti-aging products including face-masks b) Demulcents and moisturizing products c) Anti-acne products d) Skin- tanning products e) Skin-whitening products f) Hygienic and baby care products	3	6
3	**Make-up and removing make-up products:**	a1, a2, a3, a4, b2, b3, b6	agents, formulations, method of preparations**:** a) Lipsticks b) pencils c) Make up powder d) Make up removing products	2	4
Mid-term exam				1	2

4	**Bath and cleansing products**	a1, a2, a3, a4, b2, b3, b6	agents, formulations, method of preparations**:** c) Shampoos **d)** Soaps	1	2
5	**Hair care products**	a1, a2, a3, a4, b2, b3, b6	agents, formulations, method of preparations**:** a) hair tints (coloring) and bleaches (discoloring), b) conditioning products for waving, straightening and fixing, c) Depilatories (hair removals). d) hair cleansing products (lotions, powders, shampoo) **e)** Shaving products (creams, foams, lotions, etc.).	2	4
	Pleasantly Odorants	a1, a2, a3, a4, b2, b3, b6	agents, formulations, method of preparations**:** d) Perfumes e) toilet waters f) eau de Cologue.	2	4
	Oral and dental hygiene products	a1, a2, a3, a4, b2, b3, b6	agents, formulations, method of preparations**:** a) Toothpaste b) Mouthwashes **c)** Dental gels	2	4
Course Review		a1, a2, a3, a4, b2, b3, b6	Review of the course topics by discussion session.	1	2
FINAL – EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	5 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	Introduction to lab: list of experiments, how to report, etc	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
2.	preparation of anti-aging skin creams, ant-acne dermatological form.	**2**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
3.	preparation of lipsticks	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
4.	preparation of antiseptic soap	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
5.	preparation of antidandruff shampoo	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
6.	preparation of hair nutrient oil	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
7.	preparation of after-shaving product	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
8.	preparation of perfumes	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
9.	preparation of toothpaste	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
10.	preparation of dental gel	**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b4, b5, b6, c1, c2, c3, d1, d2, d3
Total		**11**	**22**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feedq-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to present a search report supported with images on 5 trade names (commercial preparations) of the studied cosmetic preparations	c4, c5, d2	4-13	3
2	**Group** :every group is assigned to present an illustrating videos on lab. And industrial preparation of 3 types of cosmetic preparations	c4, c5, d1, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b3
		Assignments	7, 12	5	5	c4, c5, d1, d2, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2, a3, a4, a5, b1, b2, b3, b6
3	Final exam (written exam)		16	50	50	a1, a2, a3, a4, a5, b1, b2, b3, b6
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b4, b5, b6, c1, c2, c3, d1, d2, d3
2		Accomplishments		5	5	
3	Final exam (practical)		12	20	20	b4, b5, b6, c1, c2, c3, d1, d2, d3
			Total	30	30 %	

VIII. Learning Resources

1- Required Textbook(s) (maximum two).

Ernest W. Flick. Cosmetic and toiletry formulations, 1996, Noyes Publications

2- Essential References.

Aulton M.E., Pharmaceutics: the science of dosage form design, 2002, Churchill Livingstone, UK

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/prashantlpingale/introduction-to-cosmetics-138603089
2. https://www.slideshare.net/bknanjwade/cosmetic-products

IX. Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

MEDICINAL CHEMISTRY III

Course Code (**PHR413**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XIX. Course Identification and General Information:

10	**Course Title:**	**MEDICINAL CHEMISTRY III**			
10	**Course Code &Number:**	**PHR413**			
11	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	**3**
11	**Study level/ semester at which this course is offered:**	*(4TH) Year – (FIRST) semester*			
11	**Pre –requisite (if any):**				
11	**Co –requisite (if any):**	**Co: PHR412 (Pharmacology & Therapeutics III)**			
11	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
11	**Language of teaching the course:**	**ENGLISH**			
11	**Location of teaching the course:**	**at THE UNIVERSITY facility**			
11	**Date of Approval**				

L: lecturing ; P: practical ; T.: training

XX. Course Description:

This course is the third one among (Medicinal chemistry) courses which are designed to provide knowledge and skills in chemistry of medicinal agents (drugs). It deals with the physicochemical properties, chemical synthesis, quantitative structure activity relationship (SAR), qualitative structure activity relationship (QSAR), pharmacophore molecules, mechanism of action, and metabolism of drugs used for cardiovascular system, blood and endocrine system disorders. Also there are practical part concerns with Pharmacopeial physicochemical properties, chemical , chromatographic or spectroscopy identification of some of those drugs.

هذا المقرر هوالثالث من بين مقررات (الكيمياء الدوائية) المصممة لتوفير المعرفة والمهارات في كيمياء الالمركبات الطبية (الأدوية). حيث يتعامل مع الخصائص الفيزيائية والكيميائية والتصنيع الكيميائي وعلاقة النشاط بالتركيب كميا (SAR) وعلاقة النشاط بالتركيب نوعيا (QSAR) والجزيئات المسؤولة عن آلية الدواء وآلية العمل واستقلاب الأدوية كل ذلك للأدوية المستخدمة في أمراض القلب والأوعية الدموية واضطرابات الدم وجهاز الغدد الصماء. هناك أيضًا جزء عملي يتعلق بمعرفة الخواص الفيزيائية والكيميائية للدواء ، والتعرف الكيميائي أو الكروماتوغرافي أو التحليل الطيفي لبعض أدوية القلب والشرايين وامراض الغدد الصماء.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

5. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.
A4	Describe analytical methods, principles, design and development techniques	**a2.** Explain the principles of synthesis, purification and metabolic reactions of drugs used for cardiovascular system, blood and endocrine disorders.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in chemical synthesis of drugs.
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the rules of structure-activity relationship to construct pharmacophore of drugs used for cardiovascular system, blood and endocrine disorders.
		b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3.** Classify, chemically, drugs affecting drugs used for cardiovascular system, blood and endocrine disorders.
		b4 . Compare between chemically related drugs based on their chemical structure
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b5.** Design newer drugs used for cardiovascular system, blood and endocrine disorders.
Professional and practical skills: upon completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory

C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4 Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

6. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.	**Active Lecture-discussion**	**Written exams**
a2. Explain the principles of synthesis, purification and metabolic reactions of drugs		

used for cardiovascular system, blood and endocrine disorders.		
a3. Describe the role of pharmacist in chemical synthesis of drugs.		
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret the rules of structure-activity relationship to construct pharmacophore of drugs used for cardiovascular system, blood and endocrine disorders.	**Active Lecture-discussion , feed-back learning**	**Written exams , quizzes**
b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing	**Active Lecture-discussion**	**Written exams**
b3. Classify, chemically, drugs affecting drugs used for cardiovascular system, blood and endocrine disorders.		
b4 . Compare between chemically related drugs based on their chemical structure		
b5. Design newer drugs used for cardiovascular system, blood and endocrine disorders.	**Group-project**	**Assignments**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and		

perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**Group-project**	**Assignments**
c4 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Lab. term works, assignment**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**laboratory practice**	**Lab. term works, final practical exam**

XV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of drugs					
1	**Cardiovascular and blood Drugs**	a1, a2, a3, b1, b2, b3, b4	Drugs affecting kidney Diuretics (high efficacy, medium efficacy, adjuvant drugs)	1	2
			Anti-hypertensive drugs ACE-inhibitors, AR-blockers, Ca-channel blockers, …etc.	1	2
			Management of congestive heart failure Cardiac glycosides, inodilators, …etc	1	2
			Anti-arrhythmic drugs Class-I, class-II, class-III, class-IV	1	2
			Drugs for ischemic heart diseases Anti-anginal drugs	1	2
			Drugs affecting blood coagulation Anti-platelet drugs, anti-coagulants, thrombolytics	1	2
			Drugs used for hyper-lipidemia Statins, fibrates, resins, …etc	1	2
			Drugs used for anemia Hematinics, folic acid, vit B12	1	2
Mid-term exam				1	2
2	**Drugs for endocrine systems disorders**	a1, a2, a3, b1, b2, b3, b4	Pituitary, hypothalamic, thyroid & parathyroid hormones GH, FSH, LH, ACTH, TSH, ..etc, T_3, T_4, calcitonin, parathormone, anti-thyroid drugs	1	2
			thyroid & parathyroid hormones T_3, T_4, anti-thyroid drugs	1	2
			Drugs used for diabetes mellitus Insulin, oral hypoglycemic drugs	1	2
			Sex hormones Female sex hormones , contraceptives	1	2
			Adrenal cortex hormones Glucocorticoids, other immunosuppressant drugs	1	2

			Drugs affecting bone, parathyroid hormones Drugs used for osteoporosis, calcitonin, parathormone, …etc	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	2 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	AlignedCourse Intended Learning Outcomes CILOs
200.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: CVS drugs: **furosemide**	**1**	**2**	c1, c2, d1, d2, d3
201.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: CVS drugs: **amlodipine**	**1**	**2**	c1, c2, d1, d2, d3
202.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: CVS drugs: **candesartan**	**1**	**2**	c1, c2, d1, d2, d3
203.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: CVS drugs: **digoxin**	**1**	**2**	c1, c2, d1, d2, d3
204.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: blood drugs: **warfarin**	**1**	**2**	c1, c2, d1, d2, d3
205.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: blood drugs: **tranexmic acid**	**1**	**2**	c1, c2, d1, d2, d3
206.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: endocrine drugs: **glibenclamide**	**1**	**2**	c1, c2, d1, d2, d3
207.	pharmacopeial physicochemical	**1**	**2**	c1, c2, d1, d2, d3

	properties , identification of endocrine drugs: **dexamethasone**			
208.	Synthesis of drugs	**2**	**4**	c1, c2, d1, d2, d3
209.	Purification of drugs.	**1**	**2**	c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	
Total		**12**	**24**	
Number of Weeks			**12**	

XLI. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XII. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Group** : each group of students will be assigned to hypothetically design newer drugs form a studied patent drug using SAR principles	b5, c3, c4, d1, d3	8	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1
		Assignments	7, 12	5	5	b5, c3, c4, d1, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2,a3 , b1, b2, b3, b4
3	Final exam (written exam)		16	50	50	a1, a2,a3 , b1, b2, b3, b4
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3
		Accomplishments		5	5	
2	Final exam (practical)		12	20	20	c1, c2, d2
			Total	30	30 %	

XLI. Learning Resources:

1- Required Textbook(s) (maximum two).

V Alagarsamy. Textbook of Medicinal Chemistry, volume I & II, 2013, Elsevier

2- Essential References.

Munendra Mohan Varshney & Asif Husain . A textbook of medicinal chemistry. 2015, I.K. International Publishing House Pvt. Limited

3- Electronic Materials and Web Sites *etc*.

1. https://pubs.acs.org/journal/jmcmar
2-https://benthamscience.com/journals/medicinal-chemistry/
3- https://www.slideshare.net/akkimipadama/medicinal-chemistry-1257073004-
4- https://slideplayer.com/slide/7330128/

XXXII. Course Policies:

95.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
96.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
97.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
98.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
99.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
100.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

MEDICINAL CHEMISTRY III

I. Course Identification and General Information:

1.	Course Title:	MEDICINAL CHEMISTRY III			
2.	Course Code &Number:	PHR413			
3.	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	3
4.	Study level/ semester at which this course is offered:	*(4TH) Year – (FIRST) semester*			
5.	Pre –requisite (if any):				
6.	Co –requisite (if any):	Co: PHR412 (Pharmacology & Therapeutics III)			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	at THE UNIVERSITY facility			
10	Date of Approval				

II. Course Description:

This course is the third one among (Medicinal chemistry) courses which are designed to provide knowledge and skills in chemistry of medicinal agents (drugs). It deals with the physicochemical properties, chemical synthesis, quantitative structure activity relationship (SAR), qualitative structure activity relationship (QSAR), pharmacophore molecules, mechanism of action, and metabolism of drugs used for cardiovascular system, blood and endocrine system disorders. Also there are practical part concerns with Pharmacopeial physicochemical properties, chemical, chromatographic or spectroscopy identification of some CVS drugs.

هذا المقرر هوالثالث من بين مقررات (الكيمياء الدوائية) المصممة لتوفير المعرفة والمهارات في كيمياء الالمركبات الطبية (الأدوية). حيث يتعامل مع الخصائص الفيزيائية والكيميائية والتصنيع الكيميائي وعلاقة النشاط بالتركيب كميا (SAR) وعلاقة النشاط بالتركيب نوعيا (QSAR) والجزيئات المسؤولة عن آلية الدواء وآلية العمل واستقلاب الأدوية كل ذلك للأدوية المستخدمة في أمراض القلب والأوعية الدموية واضطرابات الدم وجهاز الغدد الصماء. هناك أيضًا جزء عملي يتعلق بمعرفة الخواص الفيزيائية والكيميائية للدواء ، والتعرف الكيميائي أو الكروماتوغرافي أو التحليل الطيفي لبعض أدوية القلب والشرايين وامراض الغدد الصماء.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.
A4	Describe analytical methods, principles, design and development techniques	**a2.** Explain the principles of synthesis, purification and metabolic reactions of drugs used for cardiovascular system, blood and endocrine disorders.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in chemical synthesis of drugs.
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the rules of structure-activity relationship to construct pharmacophore of drugs used for cardiovascular system, blood and endocrine disorders.
		b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3.** Classify, chemically, drugs affecting drugs used for cardiovascular system, blood and endocrine disorders.
		b4 . Compare between chemically related drugs based on their chemical structure
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b5.** Design newer drugs used for cardiovascular system, blood and endocrine disorders.
Professional and practical skills: upon completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory

C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4 Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.	**Active Lecture-discussion**	**Written exams**
a2. Explain the principles of synthesis, purification and metabolic reactions of drugs used for cardiovascular system, blood and endocrine disorders.		
a3. Describe the role of pharmacist in chemical synthesis of drugs.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret the rules of structure-activity relationship to construct pharmacophore of drugs used for cardiovascular system, blood and endocrine disorders.	**Active Lecture-discussion , feed-back learning**	**Written exams , quizzes**
b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing	**Active Lecture-discussion**	**Written exams**
b3. Classify, chemically, drugs affecting drugs used for cardiovascular system, blood and endocrine disorders.		
b4 . Compare between chemically related drugs based on		

their chemical structure		
b5. Design newer drugs used for cardiovascular system, blood and endocrine disorders.	**Group-project**	**Assignments**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**Group-project**	**Assignments**
c4 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Lab. term works, assignment**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**laboratory practice**	**Lab. term works, final practical exam**

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of drugs					
1	**Cardiovascular and blood Drugs**	a1, a2, a3, b1, b2, b3, b4	Drugs affecting kidney Diuretics (high efficacy, medium efficacy, adjuvant drugs)	1	2
			Anti-hypertensive drugs ACE-inhibitors, AR-blockers, Ca-channel blockers, …etc.	1	2
			Management of congestive heart failure Cardiac glycosides, inodilators, …etc	1	2
			Anti-arrhythmic drugs Class-I, class-II, class-III, class-IV	1	2
			Drugs for ischemic heart diseases Anti-anginal drugs	1	2
			Drugs affecting blood coagulation Anti-platelet drugs, anti-coagulants, thrombolytics	1	2
			Drugs used for hyper-lipidemia Statins, fibrates, resins, …etc	1	2
			Drugs used for anemia Hematinics, folic acid, vit B12	1	2
Mid-term exam				1	2
2	**Drugs for endocrine systems disorders**	a1, a2, a3, b1, b2, b3, b4	Pituitary, hypothalamic, thyroid & parathyroid hormones GH, FSH, LH, ACTH, TSH, ..etc, T_3, T_4, calcitonin, parathormone, anti-thyroid drugs	1	2
			thyroid & parathyroid hormones T_3, T_4, anti-thyroid drugs	1	2
			Drugs used for diabetes mellitus Insulin, oral hypoglycemic drugs	1	2
			Sex hormones Female sex hormones , contraceptives	1	2
			Adrenal cortex hormones Glucocorticoids, other immunosuppressant drugs	1	2

			Drugs affecting bone, parathyroid hormones Drugs used for osteoporosis, calcitonin, parathormone, …etc	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	2 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	AlignedCourse Intended Learning Outcomes CILOs
1.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: CVS drugs: **furosemide**	**1**	**2**	c1, c2, d1, d2, d3
2.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: CVS drugs: **amlodipine**	**1**	**2**	c1, c2, d1, d2, d3
3.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: CVS drugs: **candesartan**	**1**	**2**	c1, c2, d1, d2, d3
4.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: CVS drugs: **digoxin**	**1**	**2**	c1, c2, d1, d2, d3
5.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: blood drugs: **warfarin**	**1**	**2**	c1, c2, d1, d2, d3
6.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: blood drugs: **tranexmic acid**	**1**	**2**	c1, c2, d1, d2, d3
7.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: endocrine drugs: **glibenclamide**	**1**	**2**	c1, c2, d1, d2, d3
8.	pharmacopeial physicochemical	**1**	**2**	c1, c2, d1, d2, d3

	properties , identification of endocrine drugs: **dexamethasone**			
9.	Synthesis of drugs	**2**	**4**	c1, c2, d1, d2, d3
10.	Purification of drugs.	**1**	**2**	c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	
Total		**12**	**24**	
Number of Weeks			**12**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Group** : each group of students will be assigned to hypothetically design newer drugs form a studied patent drug using SAR principles	b5, c3, c4, d1, d3	8	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1
		Assignments	7, 12	5	5	b5, c3, c4, d1, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2,a3 , b1, b2, b3, b4
3	Final exam (written exam)		16	50	50	a1, a2,a3 , b1, b2, b3, b4
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3
		Accomplishments		5	5	
2	Final exam (practical)		12	20	20	c1, c2, d2
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

V Alagarsamy. Textbook of Medicinal Chemistry, volume I & II, 2013, Elsevier

2- Essential References.

Munendra Mohan Varshney & Asif Husain . A textbook of medicinal chemistry. 2015, I.K. International Publishing House Pvt. Limited

3- Electronic Materials and Web Sites *etc*.

1. https://pubs.acs.org/journal/jmcmar
2-https://benthamscience.com/journals/medicinal-chemistry/
3- https://www.slideshare.net/akkimipadama/medicinal-chemistry-1257073004-
4- https://slideplayer.com/slide/7330128/

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Course Specification

PHARMACEUTICS IV

XXI. Course Identification and General Information:								
11	**Course Title:**	**PHARMACEUTICS IV**						
11	**Course Code &Number:**	**PHR418**						
12	**Credit hours:**	C.H						TOTAL
		Theoretical			P.	Tr.		
		L.	Tut.	S.				
		2	-	-	1	-		**3**
12	**Study level/ semester at which this course is offered:**	*(FOURTH) Year – (FIRST) semester*						
12	**Pre –requisite (if any):**	• **Pharmaceutics III**						
12	**Co –requisite (if any):**							
12	**Program (s) in which the course is offered:**	**All BC programs offered by the university**						
12	**Language of teaching the course:**	**ENGLISH**						
12	**Location of teaching the course:**	**IN THE UNIVERSITY**						
12	**Prepared By:**							
12	**Date of Approval**							

L: lecturing ; Tut: Tutorial , S: seminar ; P: practical ; Tr.: training

XXII. Course Description:

The course deals with the study of principles and techniques of advanced and novel drug delivery systems & dosage forms.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

38. Alignment CILOs to PILOs

No.	PILOs	CILOs
37.	A2	**a1.** Explicit the general properties, advantages and disadvantages of advanced and novel drug delivery systems & dosage forms.
38.	A3	**a2**. Discuss the principles, pharmacopeial requirements, methods of preparation, of various types of advanced and novel drug delivery systems & dosage forms..
39.		**a3**. Explicit the types and roles of excipients included in different types of advanced and novel drug delivery systems & dosage forms..
40.	A4	**a4.** Comprehend his/her role as pharmacist in formulation of pharmaceutical dosage forms.
41.	B1	**b1.** Calculate the amount of ingredient required to prepare an enlarged or reduced amount of a pharmaceutical formula.
42.	B2	**b2 .**Categorize advanced and novel drug delivery systems & dosage forms.
43.		**b3.** Compare between various types of advanced and novel drug delivery systems & dosage forms.
44.	B3	**b4.** Relate the selection of excipients and the method of preparation advanced and novel drug delivery systems & dosage forms to formulation, compatibility and stability factors.
45.		**b5.** Formulate the active ingredient and excipients into an appropriate advanced and novel drug delivery systems & dosage forms..
46.	B4	**b6 .** Assess the quality of the prepared advanced and novel drug delivery systems & dosage forms.
47.	C1	**c1.**Handle efficiently the tools and chemicals used in pharmaceutics Lab.
48.		**c2.** Operate successfully the instruments used in pharmaceutics Lab.
49.	C2	**c3.** Prepare successfully pharmaceutical solid dosage forms including tablets and capsules and sterile pharmaceutical dosage forms using standard procedures.
50.	C3	**c4 .**Take the required safety criteria during preparation pharmaceutical

		dosage forms in pharmaceutics Lab.
51.	**C4**	**c5 .**Search efficiently for information using documented and electronic sources of information.
52.		**c6.** Present and report his/her works correctly using appropriate writing rules and technologies media.
53.	**D1**	**d1.** Share successfully in team-work.
54.	**D2**	**d2.** Comply to pharmacy laws and ethics and behave in discipline during practical works
55.	**D3**	**d3.** Communicate effectively with colleagues..
56.	**D4**	**d4.** Demonstrate the ability of time management and self-learning.

39. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1, a2, a3, a4, a5	**Lecture, feed-back leaning**	**Written exam , Attendance, assignment**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1, b2, b3, b4	**Lecture, feed-back learning**	**Written exam , Attendance, assignments**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1, c2	**feed-back learning, Group-project**	**Assignments**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1, d3, d4	**Feed-back learning**	**Assignments**

d2	Lecture, lab practice	Written exam , Attendance

XXVI. Course Content:

A. THEORTICAL PART

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**introduction to advanced and novel drug delivery systems**	a4	• The need for advanced and novel drug delivery systems o Factors related to patients convenience o New diseases : new challenges o Diseases resistant to classical systems o Other factors o Comparison between advanced and classical delivery systems	1	2
2	**Extended release systems**	a1, a2, a3, a4, a5, b1, b2, b3, b4, d2, d4	• Definition and purposes • Concepts of extended-release, sustained-release • Advantages and limitations, • Biological features affecting extended-delivery system. • multiple units coating (pellets) • Technology of Microencapsulation (microspheres) • floating tablets • bilayer and multiple layer-tablets	4	8
3	**Transdermal delivery systems**	a1, a2, a3, a4, a5, b1, b2, b3, b4, d2, d4	• Biological features affecting transdemal delivery system. • Principle, components, formulation, advantages, disadvantages types and applications of :	4	8

			○ Patches ○ Phonophoresis ○ Inotophoresis ○ Electroporation ○ Needle array and needleless injection systems ○ Percutaneous enhancers		
	mid-term exam			1	2
4	**advanced Sterile systems**	a1, a2, a3, a4, a5, b1, b2, b3, b4, d2, d4	Principle, components, formulation, advantages, disadvantages types and applications of : : ○ Implants ○ Ocuserts	2	4
5	**advanced inhalation delivery systems**	a1, a2, a3, a4, a5, b1, b2, b3, b4, d2, d4	• Biological features affecting inhalation delivery system. • Principle, components, formulation, advantages, disadvantages types and applications of : ○ Dry solid inhaler systems	1	2
6	**advanced intravaginal delivery systems**	a1, a2, a3, a4, a5, b1, b2, b3, b4, d2, d4	• Biological features affecting newer intravaginal delivery system. • Principle, components, formulation, advantages, disadvantages and types of intravaginal systems	1	2
Course Review		a1, a2, a3, a4, a5, b1, b2, b3, b4, d2, d4	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	6

		Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
210.	Preparation of pellets	**1**	**2**	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
211.	Preparation of microspheres	**2**	**4**	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
212.	extended-release coated of tablets	**2**	**4**	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
213.	Preparation of floating tablets	**1**		b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
214.	Preparation of bilayer tablets	**2**	**4**	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
215.	Preparation of transdermal patches	**1**	**2**	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
216.	study of ocuserts	**1**	**2**	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
217.	study of dry inhaler system	**1**	**2**	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
Total		**12**	**24 equivalent to 12 credit hours**	
Number of Weeks			**12**	

XLII. Teaching strategies of the course:

Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XL. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to provide a summary of one of the studied topics.	c3, c4,	4-13	6
2	**Group** : each group of students will be assigned to provide a search-based report of one novel drug delivery systems	c3, c4, d1, d3,	14	4

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method	Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Attendance	1 - 15	2	2	a1, a2, a3, b2 , b3, b4, b5
2	Assignments (1 + 2)	4, 14	5	5	c5, c6, d1, d4
3	Quiz 1 + Quiz 2	7, 12	3	3	b3
4	Mid-semester exam of theoretical part (written exam	7	10	10	a3, b2, b3
5	Final exam of theoretical part (written exam)	17	40	40	a1, a2, a3, b2 , b3, b4, b5
		TOTAL	60	60 %	60

Practical part assessment

No.	Assessment Method	Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Attendance	Weekly	5	5	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
2	Lab. Attitude	weekly	2	2	c4, d1, d3, d4
3	Lab. Accomplishments	weekly	5	5	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
4	Lab. Reporting	weekly	3	3	c6
5	Exam of practice theory (written exam or oral exam)	14	5	5	b1, b6
6	Practical exam (practical)	14	20	20	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
		Total	40	40 %	

XLII. Learning Resources:

1- Required Textbook(s) (maximum two).

19. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins
20. Kewal k. Jain. drug delivery systems

2- Essential References.

21. Ottenbrite. Polymeric drugs & drug delivery system
1. Aulton M.E., Pharmaceutics: the science of dosage form design, 2002, Churchill Livingstone.

3- Electronic Materials and Web Sites *etc*.

www.en.*wikipedia.org/*

XXXIII. Course Policies:

101.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
102.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
103.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
104.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Course Plan (Syllabus) of

PHARMACEUTICS IV

II. Course Description:

The course deals with the study of principles and techniques of advanced and novel drug delivery systems & dosage forms.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

No.	PILOs	CILOs
1.	A2	**a1.** Explicit the general properties, advantages and disadvantages of advanced and novel drug delivery systems & dosage forms.
2.	A3	**a2**. Discuss the principles, pharmacopeial requirements, methods of preparation, of various types of advanced and novel drug delivery systems & dosage forms..
3.		**a3**. Explicit the types and roles of excipients included in different types of advanced and novel drug delivery systems & dosage forms..
4.	A4	**a4.** Comprehend his/her role as pharmacist in formulation of pharmaceutical dosage forms.
5.	B1	**b1.** Calculate the amount of ingredient required to prepare an enlarged or reduced amount of a pharmaceutical formula.
6.	B2	**b2 .**Categorize advanced and novel drug delivery systems & dosage forms.
7.		**b3.** Compare between various types of advanced and novel drug delivery systems & dosage forms.
8.	B3	**b4.** Relate the selection of excipients and the method of preparation advanced and novel drug delivery systems & dosage forms to formulation, compatibility and stability factors.
9.		**b5.** Formulate the active ingredient and excipients into an appropriate advanced and novel drug delivery systems & dosage forms..
10.	B4	**b6 .** Assess the quality of the prepared advanced and novel drug delivery systems & dosage forms.
11.	C1	**c1.**Handle efficiently the tools and chemicals used in pharmaceutics Lab.
12.		**c2.** Operate successfully the instruments used in pharmaceutics Lab.
13.	C2	**c3.** Prepare successfully pharmaceutical solid dosage forms including tablets and capsules and sterile pharmaceutical dosage forms using standard procedures.
14.	C3	**c4 .**Take the required safety criteria during preparation pharmaceutical

		dosage forms in pharmaceutics Lab.
15.	**C4**	**c5 .**Search efficiently for information using documented and electronic sources of information.
16.		**c6.** Present and report his/her works correctly using appropriate writing rules and technologies media.
17.	**D1**	**d1.** Share successfully in team-work.
18.	**D2**	**d2.** Comply to pharmacy laws and ethics and behave in discipline during practical works
19.	**D3**	**d3.** Communicate effectively with colleagues..
20.	**D4**	**d4.** Demonstrate the ability of time management and self-learning.

+

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1, a2, a3, a4, a5	**Lecture, feed-back leaning**	**Written exam , Attendance, assignment**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1, b2, b3, b4	**Lecture, feed-back learning**	**Written exam , Attendance, assignments**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1, c2	**feed-back learning, Group-project**	**Assignments**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies

d1, d3, d4	Feed-back learning	Assignments
d2	Lecture, lab practice	Written exam , Attendance

IV. Course Content:

A. THEORTICAL PART

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**introduction to advanced and novel drug delivery systems**	a4	• The need for advanced and novel drug delivery systems o Factors related to patients convenience o New diseases : new challenges o Diseases resistant to classical systems o Other factors o Comparison between advanced and classical delivery systems	1	2
2	**Extended release systems**	a1, a2, a3, a4, a5, b1, b2, b3, b4, d2, d4	• Definition and purposes • Concepts of extended-release, sustained-release • Advantages and limitations, • Biological features affecting extended-delivery system. • multiple units coating (pellets) • Technology of Microencapsulation (microspheres) • floating tablets • bilayer and multiple layer-tablets	4	8
3	**Transdermal delivery systems**	a1, a2, a3, a4, a5, b1, b2, b3, b4, d2, d4	• Biological features affecting transdemal delivery system. • Principle, components, formulation, advantages,	4	8

			disadvantages types and applications of : ○ Patches ○ Phonophoresis ○ Inotophoresis ○ Electroporation ○ Needle array and needleless injection systems ○ Percutaneous enhancers		
	mid-term exam			1	2
4	**advanced Sterile systems**	a1, a2, a3, a4, a5, b1, b2, b3, b4, d2, d4	Principle, components, formulation, advantages, disadvantages types and applications of : : ○ Implants ○ Ocuserts	2	4
5	**advanced inhalation delivery systems**	a1, a2, a3, a4, a5, b1, b2, b3, b4, d2, d4	• Biological features affecting inhalation delivery system. • Principle, components, formulation, advantages, disadvantages types and applications of : ○ Dry solid inhaler systems	1	2
6	**advanced intravaginal delivery systems**	a1, a2, a3, a4, a5, b1, b2, b3, b4, d2, d4	• Biological features affecting newer intravaginal delivery system. • Principle, components, formulation, advantages, disadvantages and types of intravaginal systems	1	2
Course Review		a1, a2, a3, a4, a5, b1, b2, b3, b4, d2, d4	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2

TOTAL	16	32
Number of Weeks /and Units Per Semester	16 weeks	6 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	Preparation of pellets	**1**	**2**	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
2.	Preparation of microspheres	**2**	**4**	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
3.	extended-release coated of tablets	**2**	**4**	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
4.	Preparation of floating tablets	**1**		b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
5.	Preparation of bilayer tablets	**2**	**4**	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
6.	Preparation of transdermal patches	**1**	**2**	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
7.	study of ocuserts	**1**	**2**	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
8.	study of dry inhaler system	**1**	**2**	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
Total		**12**	**24 equivalent to 12 credit hours**	
Number of Weeks			**12**	

V. Teaching strategies of the course:

Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to provide a summary of one of the studied topics.	c3, c4,	4-13	6
2	**Group** : each group of students will be assigned to provide a search-based report of one novel drug delivery systems	c3, c4, d1, d3,	14	4

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method	Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Attendance	1 - 15	2	2	a1, a2, a3, b2 , b3, b4, b5
2	Assignments (1 + 2)	4, 14	5	5	c5, c6, d1, d4
3	Quiz 1 + Quiz 2	7, 12	3	3	b3
4	Mid-semester exam of theoretical part (written exam	7	10	10	a3, b2, b3
5	Final exam of theoretical part (written exam)	17	40	40	a1, a2, a3, b2 , b3, b4, b5
		TOTAL	60	60 %	60

Practical part assessment

No.	Assessment Method	Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Attendance	Weekly	5	5	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
2	Lab. Attitude	weekly	2	2	c4, d1, d3, d4
3	Lab. Accomplishments	weekly	5	5	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
4	Lab. Reporting	weekly	3	3	c6
5	Exam of practice theory (written exam or oral exam)	14	5	5	b1, b6
6	Practical exam (practical)	14	20	20	b1, b6, c1, c2, c3, c4, c6, d1, d2, d3
		Total	40	40 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins
2. Kewal k. Jain. drug delivery systems

2- Essential References.

1. Ottenbrite. Polymeric drugs & drug delivery system
2. Aulton M.E., Pharmaceutics: the science of dosage form design, 2002, Churchill Livingstone.

3- Electronic Materials and Web Sites *etc*.

www.en.*wikipedia.org/*

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PHARMACOECONOMICS

Course No. (68)
Course Code (**PHR525**)

2020/2021

This template of course specifications was prepared by CAQA, Yemen, 2017.

I. Course Identification and General Information:

129	**Course Title:**	**Pharmacoeconomics**			
130	**Course Code &Number:**	**PHR525**			
131	**Credit hours:**	C.H			TOTAL
		L.	P.	T.	
		2	-	-	**2**
132	**Study level/ semester at which this course is offered:**	*(FIFTH) Year – (2nd) semester*			
133	**Pre –requisite (if any):**	--			
134	**Co –requisite (if any):**	**PHR521 (Pharmaceutical Marketing)**			
135	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
136	**Language of teaching the course:**	**ENGLISH**			
137	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**			
138	**Prepared by**				
139	**Date of Approval**	**2020**			

L: lecturing ; P: practical ; T.: training

IX. Course Description:

This course provides the students in the first part with basic knowledge and skills necessary to carry out pharmacoeconomics analysis in order to select a drug product or therapy among other ones by comparing their cost and outcomes. The course deals with the knowledge of students with best method for analysis that may be used for select the suitable method of therapy or suitable economic method for purchase. The second part of the course deals with methodologies and concepts of (Pharmacoepidemology) which is study of the uses and effects of drugs in well-defined populations. The course also provides a link of pharmacoepidemology to Pharmacovigillance which is assessment , detection and monitoring of adverse effects of drugs in the market.

يزود هذا المقرر الطلاب بالمعرفة والمهارات الأساسية اللازمة لإجراء تحليل اقتصاديات الدواء من أجل اختيار منتج دوائي أو علاج من بين المنتجات الأخرى من خلال مقارنة التكلفة والنتائج. يرتبط هذا المقرر بمعرفة الطلاب بأفضل طريقة للتحليل يمكن استخدامها لتحديد طريقة العلاج المناسبة أو الطريقة الاقتصادية المناسبة للشراء.. يتناول الجزء الثاني من المقرر الدراسي منهجيات ومفاهيم (فارماكوبيميولوجيا) وهي دراسة استخدامات وتأثيرات الأدوية في مجموعات سكانية محددة جيدًا. توفر الدورة أيضًا رابطًا بين علم الأوبئة الدوائية والمراقبة الدوائية والتي تتمثل في تقييم واكتشاف ورصد الآثار الضارة للأدوية في السوق.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

40. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A4	Describe analytical methods, principles, design and development techniques	**a1.** Describe the analysis methods of Pharmacoeconomics, pharmacoepidemology and Pharmacovigillance
A9	Define the basis of health policy, Pharmacoeconomics, pharmacoepidemology , pharmaceutical marketing and administration.	**a2.** Define the basis of pharmacoeconomics, Pharmacoeconomics, pharmacoepidemology and Pharmacovigillance
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacists to evaluate drug products and therapies using pharmacoeconomical and pharmacoepidemological methods
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret outcome data of pharmacoeconomic and pharmacoepidemology analysis.
B8	Use appropriate research methods including experimental, observational and electronic to collect data and solve problems.	**b2 .** Apply pharmacoeconomic and pharmacoepidemological calculations to evaluate drug products or therapies.
Professional and practical skills: upon completion of the course, students will be able to:		
C6	Apply administrative and Pharmacoeconomics rules in pharmacy and ethically use marketing skills for drug promotion.	**c2 .** Apply rules of pharmacoeconomics and pharmacoepidemology rules in pharmacy practice.
Transferable skills: upon completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate skills of time management, problem-solving and decision making.
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d2.** Take responsibility of adaptation to changes need in pharmacy practice.

41. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Describe the analysis methods of Pharmacoeconomics, pharmacoepidemology and Pharmacovigillance	**Active Lecture-discussion**	**Written exams**
a2. Define the basis of pharmacoeconomics, pharmacoepidemology and Pharmacovigillance		
a3. Describe the role of pharmacists to evaluate drug products and therapies using pharmacoeconomical and pharmacoepidemological methods		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret outcome data of pharmacoeconomic and pharmacoepidemology analysis.	**Active Lecture-discussion, feed-back learning**	**Written exams, quizzes**
b2 . Apply pharmacoeconomic and pharmacoepidemological calculations to evaluate drug products or therapies.	**Feed-back learning**	**Assignment**

(c) Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

c2 . Apply rules of pharmacoeconomics and pharmacoepidemology rules in pharmacy practice.	**Feed-back learning**	**Assignment**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate skills of time management, problem-solving and decision making.	**Feed-back learning**	**Assignment**
d2. Take responsibility of adaptation to changes need in pharmacy practice.		

XXVII. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
Part I: Pharmacoeconomics					
1	**Introduction to pharmacoeconomics**	a1, a2, a3, b1, b2	• Definition and scope • Evolution of pharmacoeconomics • The need to pharmacoeconomics evaluation • Types of Outcomes. • Types of costs, Monetary units • Types of perspectives	1	2
2	**Pharmacoeconomics analysis**	a1, a2, a3, b1, b2	• Types of pharmacoeconomics analysis studies and how to select the proper study? • Steps to carry out a pharmacoeconomics study • Methodology, outcomes, cost , analysis of cost-outcome ratios and examples of case studies (Solved and exercises) of the following pharmacoeconomics methods : o COI (cost of illness) o CEA (cost-effectiveness analysis) o CBA(cost-benefit analysis) o CUA(cost-utility analysis)	5	10
Mid-term exam				1	2
Part II: Pharmacoepidemology					
3	**Introduction to pharmacoepidemology**	a1, a2, a3, b1, b2	• Definition and scope • Origin and evaluation • The need to pharmacoepidemology • Aims and applications	1	2

4	**Measurement of outcomes**	a1, a2, a3, b1, b2	Methodology and case studies examples (solved and exercises) • Outcome measure and drug use measures • Prevalence, incidence, incidence rate • Number of prescriptions and units of drugs dispensed • Daily dose • Medication adherence measurement	2	4
5	**Concept of risks**	a1, a2, a3, b1, b2	• Measurement of risk • Attributable risks • Relative risks • Time-risk relationship • Odds ratios	1	2
6	**Pharmacoepide mological methods**	a1, a2, a3, b1, b2	Methodology and examples of • Drug utilization review • Case reports • Case series • Case control studies • Case-cohort studies • Meta-analysis • Spontaneous reporting • Prescription events monitoring	2	4
7	**Pharmacovigilla nce relationship to pharmacoepide mology**	a1, a2, a3, b1, b2	• Definition and scope of Pharmacovigillance • Pharmacovigillance methods and systems • Relation to pharmacoepidemology	2	4
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

XLIII. Teaching strategies of the course:

Active lecture - Discussion: a short lecture/ address followed by discussion

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

XLI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: Each student is assigned to solve pharmacoeconomic and pharmacoepidemology problems as homework	b2, c1, d1, d2	4-13	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b1
		Assignments	7, 12	10	10	b2, c1, d1, d2
2	Mid-semester exam of theoretical part (written exam		7	20	20	a1, a2, a3, b1, b2
3	Final exam of theoretical part (written exam)		16	60	60	a1, a2, a3, b1, b2
			TOTAL	100	100 %	

XLIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Brian L. Strom. Textbook of pharmacoepidemology, John Wiley & Sons Ltd
2. Pharmacoeconomic From Theory to Practice Renee J. G. Arnold

2- Essential References.

1. Diprio Pharmacotherapy pathophysiologic approaches

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/ShivarajD4/pharmacoepidemiology-and-pharmacoeconomics
2. https://www.slideshare.net/Divyasingh370/pharmacoeconomics-pharmacoepidemioology

XXXIV. Course Policies:

105.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
106.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
107.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
108.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
109.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
110.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

PHARMACOECONOMIC

Course No. (68)

Information about Faculty Member Responsible for the Course:							
Name of Faculty Member		**Office Hours**					
Location& Telephone No.		**SAT**	**SUN**	**MON**	**TUE**	**WED**	**THU**
E-mail							

I. Course Identification and General Information:

1.	Course Title:	Pharmacoeconomics			
2.	Course Code &Number:	PHR525			
3.	Credit hours:	C.H			TOTAL
		L.	P.	T.	
		2	-	-	**2**
4.	Study level/ semester at which this course is offered:	*(FIFTH) Year – (2nd) semester*			
5.	Pre –requisite (if any):	--			
6.	Co –requisite (if any):	PHR521 (Pharmaceutical Marketing)			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FACILITY			
10.	Prepared by				
11.	Date of Approval	2020			

L: lecturing ; P: practical ; T.: training

II. Course Description:

This course provides the students in the first part with basic knowledge and skills necessary to carry out pharmacoeconomics analysis in order to select a drug product or therapy among other ones by comparing their cost and outcomes. The course deals with the knowledge of students with best method for analysis that may be used for select the suitable method of therapy or suitable economic method for purchase. The second part of the course deals with methodologies and concepts of (Pharmacoepidemology) which is study of the uses and effects of drugs in well-defined populations. The course also provides a link of pharmacoepidemology to Pharmacovigillance which is assessment , detection and monitoring of adverse effects of drugs in the market.

يزود هذا المقرر الطلاب بالمعرفة والمهارات الأساسية اللازمة لإجراء تحليل اقتصاديات الدواء من أجل اختيار منتج دوائي أو علاج من بين المنتجات الأخرى من خلال مقارنة التكلفة والنتائج. يرتبط هذا المقرر بمعرفة الطلاب بأفضل طريقة للتحليل يمكن استخدامها لتحديد طريقة العلاج المناسبة أو الطريقة الاقتصادية المناسبة للشراء.. يتناول الجزء الثاني من المقرر الدراسي منهجيات ومفاهيم (فارماكوبيميولوجيا) وهي دراسة استخدامات وتأثيرات الأدوية في مجموعات سكانية محددة جيدًا. توفر الدورة أيضًا رابطًا بين علم الأوبئة الدوائية والمراقبة الدوائية والتي تتمثل في تقييم واكتشاف ورصد الآثار الضارة للأدوية في السوق.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A4	Describe analytical methods, principles, design and development techniques	**a1.** Describe the analysis methods of Pharmacoeconomics, pharmacoepidemology and Pharmacovigillance
A9	Define the basis of health policy, Pharmacoeconomics, pharmacoepidemology , pharmaceutical marketing and administration.	**a2.** Define the basis of pharmacoeconomics, Pharmacoeconomics, pharmacoepidemology and Pharmacovigillance
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacists to evaluate drug products and therapies using pharmacoeconomical and pharmacoepidemological methods
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret outcome data of pharmacoeconomic and pharmacoepidemology analysis.
B8	Use appropriate research methods including experimental, observational and electronic to collect data and solve problems.	**b2 .** Apply pharmacoeconomic and pharmacoepidemological calculations to evaluate drug products or therapies.
Professional and practical skills: upon completion of the course, students will be able to:		
C6	Apply administrative and Pharmacoeconomics rules in pharmacy and ethically use marketing skills for drug promotion.	**c2 .** Apply rules of pharmacoeconomics and pharmacoepidemology rules in pharmacy practice.
Transferable skills: upon completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate skills of time management, problem-solving and decision making.
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d2.** Take responsibility of adaptation to changes need in pharmacy practice.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Describe the analysis methods of Pharmacoeconomics, pharmacoepidemology and Pharmacovigillance	**Active Lecture-discussion**	**Written exams**
a2. Define the basis of pharmacoeconomics, pharmacoepidemology and Pharmacovigillance		
a3. Describe the role of pharmacists to evaluate drug products and therapies using pharmacoeconomical and pharmacoepidemological methods		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret outcome data of pharmacoeconomic and pharmacoepidemology analysis.	**Active Lecture-discussion, feed-back learning**	**Written exams, quizzes**
b2 . Apply pharmacoeconomic and pharmacoepidemological calculations to evaluate drug products or therapies.	**Feed-back learning**	**Assignment**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

c2 . Apply rules of pharmacoeconomics and pharmacoepidemology rules in pharmacy practice.	**Feed-back learning**	**Assignment**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate skills of time	**Feed-back learning**	**Assignment**

management, problem-solving and decision making.		
d2. Take responsibility of adaptation to changes need in pharmacy practice.		

XVIII. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
Part I: Pharmacoeconomics					
1	**Introduction to pharmacoeconomics**	a1, a2, a3, b1, b2	• Definition and scope • Evolution of pharmacoeconomics • The need to pharmacoeconomics evaluation • Types of Outcomes. • Types of costs, Monetary units • Types of perspectives	1	2
2	**Pharmacoeconomics analysis**	a1, a2, a3, b1, b2	• Types of pharmacoeconomics analysis studies and how to select the proper study? • Steps to carry out a pharmacoeconomics study • Methodology, outcomes, cost , analysis of cost-outcome ratios and examples of case studies (Solved and exercises) of the following pharmacoeconomics methods : o COI (cost of illness) o CEA (cost-effectiveness analysis) o CBA(cost-benefit analysis) o CUA(cost-utility analysis)	5	10
Mid-term exam				1	2
Part II: Pharmacoepidemology					
3	**Introduction to pharmacoepidemology**	a1, a2, a3, b1, b2	• Definition and scope • Origin and evaluation • The need to pharmacoepidemology • Aims and applications	1	2

4	**Measurement of outcomes**	a1, a2, a3, b1, b2	Methodology and case studies examples (solved and exercises) • Outcome measure and drug use measures • Prevalence, incidence, incidence rate • Number of prescriptions and units of drugs dispensed • Daily dose • Medication adherence measurement	2	4
5	**Concept of risks**	a1, a2, a3, b1, b2	• Measurement of risk • Attributable risks • Relative risks • Time-risk relationship • Odds ratios	1	2
6	**Pharmacoepidemological methods**	a1, a2, a3, b1, b2	Methodology and examples of • Drug utilization review • Case reports • Case series • Case control studies • Case-cohort studies • Meta-analysis • Spontaneous reporting • Prescription events monitoring	2	4
7	**Pharmacovigillance relationship to pharmacoepidemology**	a1, a2, a3, b1, b2	• Definition and scope of Pharmacovigillance • Pharmacovigillance methods and systems • Relation to pharmacoepidemology	2	4
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

V. Teaching strategies of the course:

Active lecture - Discussion: a short lecture/ address followed by discussion

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: Each student is assigned to solve pharmacoeconomic and pharmacoepidemology problems as homework	b2, c1, d1, d2	4-13	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b1
		Assignments	7, 12	10	10	b2, c1, d1, d2
2	Mid-semester exam of theoretical part (written exam		7	20	20	a1, a2, a3, b1, b2
3	Final exam of theoretical part (written exam)		16	60	60	a1, a2, a3, b1, b2
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Brian L. Strom. Textbook of pharmacoepidemology, John Wiley & Sons Ltd
2. Pharmacoeconomic From Theory to Practice Renee J. G. Arnold

2- Essential References.

1. Diprio Pharmacotherapy pathophysiologic approaches

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/ShivarajD4/pharmacoepidemiology-and-pharmacoeconomics
2. https://www.slideshare.net/Divyasingh370/pharmacoeconomics-pharmacoepidemioology

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PHARMACOLOGY & THERAPEUTICS III

Course Code (**PHR412**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XXIII. Course Identification and General Information:

14	**Course Title:**	**PHARMACOLOGY & THERAPEUTICS III**			
14	**Course Code &Number:**	**PHR 412**			
14	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		3	-	-	**3**
14	**Study level/ semester at which this course is offered:**	*(4TH) Year – (FIRST) semester*			
14	**Pre –requisite (if any):**				
14	**Co –requisite (if any):**	**PHR413 (Medicinal chemistry III)**			
14	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
14	**Language of teaching the course:**	**ENGLISH**			
14	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**			
14	**Date of Approval**				

L: lecturing ; P: practical ; T.: training

XXIV. Course Description:

This course also as the previous courses (pharmacology & therapeutics I II) deals with the study of pharmacodynamics (mechanism of action, therapeutic effect, adverse effects) and pharmacokinetics (absorption, distribution, metabolism, execration) of drugs that used for treatment of Cardiovascular System, blood and endocrine disorders.

يتناول هذا المقرر الدراسي أيضًا كالمقررات السابقة (علم الأدوية والتداوي I II) دراسة الديناميكيات الدوائية (آلية العمل، والآثار العلاجية، والآثار السلبية) والحركية الدوائية (الامتصاص، والتوزيع، والتمثيل الغذائي، والإخراج) للأدوية المستخدمة في علاج أمراض القلب والأوعية الدموية و الدم والغدد الصماء.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A5	Identify actions of medicines on human body.	**a1.** Identify the actions of medicines in human body, their therapeutic uses, adverse effects drug interactions and interactions
A8	Describe Biopharmaceutics and pharmacokinetics of medicines	**a2.** Describe the pharmacokinetics of drugs.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in providing correct information on rational use of medications.
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1 .**Classify drugs used for disorders of drugs used for cardiovascular system, blood and endocrine disorders
		b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency)and drug limitations.
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1.** Advise the patient and healthcare professional to optimize medicine use
Transferable skills: upon completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate time management and decision making skills.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the actions of medicines in human body, their therapeutic uses, adverse effects drug interactions and interactions	**Active Lecture**	**Written exams**
a2. Describe the pharmacokinetics of drugs.		
a3. Describe the role of pharmacist in providing correct information on rational use of medications.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 . Classify drugs used for disorders of drugs used for cardiovascular system, blood and endocrine disorders	**Active Lecture**	**Written exams**
b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency)and drug limitations.	**Active Lecture, feed-back learning**	**Written exam , quizzes, assignments**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Advise the patient and healthcare professional to optimize medicine use	**feed-back learning**	**assignment**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate time management and decision making skills.	**Feed-back learning**	**Assignments**

XIX. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Cardiovascular and blood pharmacology**	a1, a2, a3, b1	Drugs affecting kidney Diuretics (high efficacy, medium efficacy, adjuvant drugs)	1	2
			Anti-hypertensive drugs ACE-inhibitors, AR-blockers, Ca-channel blockers, …etc.	1	2
			Management of congestive heart failure Cardiac glycosides, …etc.	1	3
			Anti-arrhythmic drugs Class-I, class-II, class-III, class-IV	1	3
			Drugs for ischemic heart diseases Anti-anginal drugs	1	3
			Drugs affecting blood coagulation Anti-platelet drugs, anti-coagulants, thrombolytics	1	3
			Drugs used for hyper-lipidemia Statins, fibrates, resins, …etc	1	3
			Drugs used for anemia Hematinics, folic acid, vit B12	1	3
			Mid-term exam	1	3
2	**Drugs for endocrine systems disorders**	a1, a2, a3, b1	Pituitary, hypothalamic, thyroid & parathyroid hormones GH, FSH, LH, ACTH, TSH, ..etc, T_3, T_4, calcitonin, parathormone, anti-thyroid drugs	1	3
			thyroid & parathyroid hormones T_3, T_4, anti-thyroid drugs	1	3
			Drugs used for diabetes mellitus Insulin, oral hypoglycemic drugs	1	3
			Sex hormones Female sex hormones , contraceptives	1	3
			Adrenal cortex hormones Glucocorticoids, other immunosuppressant drugs	1	3

			Drugs affecting bone, parathyroid hormones Drugs used for osteoporosis, calcitonin, parathormone, …etc	1	3
FINAL – EXAM				1	3
TOTAL				16	48

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to solve a list of problems related to advising healthcare of medicines use based comparison of drug benefits and risks for specific patients e.g. CVS patients, renal failure patients, etc.	b1, c1, d1	6-12	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b2
		Assignments	7, 12	10	10	b1, c1, d1
2	Mid-semester exam (written exam)		7	20	20	a1, a2, a3, b1
3	Final exam (written exam)		16	60	60	a1, a2, a3, b1
		TOTAL		100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Katzung –Basic and Clinical Pharmacology, 2013, McGraw-Hill

2- Essential References.

Richard A. Harvey. Lippincott's pharmacology, 2012, Lippincott William and Wilkins.

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/crisbertc/cardiovascular-drugs
2. https://www.slideshare.net/ameenharriss/endocrine-pharmacology-in-brief

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

PHARMACOLOGY & THERAPEUTICS III

I. Course Identification and General Information:

1.	Course Title:	PHARMACOLOGY & THERAPEUTICS III			
2.	Course Code &Number:	PHR412			
3.	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		3	-	-	3
4.	Study level/ semester at which this course is offered:	(4TH) Year – (FIRST) semester			
5.	Pre –requisite (if any):				
6.	Co –requisite (if any):	PHR413 (Medicinal chemistry III)			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FACILITY			
10	Date of Approval				

II. Course Description:

This course also as the previous courses (pharmacology & therapeutics I II) deals with the study of pharmacodynamics (mechanism of action, therapeutic effect, adverse effects) and pharmacokinetics (absorption, distribution, metabolism, execration) of drugs that used for treatment of Cardiovascular System, blood and endocrine disorders.

يتناول هذا المقرر الدراسي أيضًا كالمقررات السابقة (علم الأدوية و التداوي I , II) دراسة الديناميكيات الدوائية (آلية العمل ، والآثار العلاجية ، والآثار السلبية) والحركية الدوائية (الامتصاص ، والتوزيع ، والتمثيل الغذائي ، والإخراج) للأدوية المستخدمة في علاج أمراض القلب والأوعية الدموية و الدم والغدد الصماء.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A5	Identify actions of medicines on human body.	**a1.** Identify the actions of medicines in human body, their therapeutic uses, adverse effects drug interactions and interactions
A8	Describe Biopharmaceutics and pharmacokinetics of medicines	**a2.** Describe the pharmacokinetics of drugs.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in providing correct information on rational use of medications.
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1 .**Classify drugs used for disorders of drugs used for cardiovascular system, blood and endocrine disorders
		b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency)and drug limitations.
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1 .** Advise the patient and healthcare professional to optimize medicine use
Transferable skills: upon completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate time management and decision making skills.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the actions of medicines in human body, their therapeutic uses, adverse effects drug interactions and interactions	**Active Lecture**	**Written exams**
a2. Describe the pharmacokinetics of drugs.		
a3. Describe the role of pharmacist in providing correct information on rational use of medications.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 . Classify drugs used for disorders of drugs used for cardiovascular system, blood and endocrine disorders	**Active Lecture**	**Written exams**
b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency)and drug limitations.	**Active Lecture, feed-back learning**	**Written exam , quizzes, assignments**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Advise the patient and healthcare professional to optimize medicine use	**feed-back learning**	**assignment**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate time management and decision making skills.	**Feed-back learning**	**Assignments**

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Cardiovascular and blood pharmacology**	a1, a2, a3, b1	Drugs affecting kidney Diuretics (high efficacy, medium efficacy, adjuvant drugs)	1	3
			Anti-hypertensive drugs ACE-inhibitors, AR-blockers, Ca-channel blockers, …etc.	1	3
			Management of congestive heart failure Cardiac glycosides, …etc.	1	3
			Anti-arrhythmic drugs Class-I, class-II, class-III, class-IV	1	3
			Drugs for ischemic heart diseases Anti-anginal drugs	1	3
			Drugs affecting blood coagulation Anti-platelet drugs, anti-coagulants, thrombolytics	1	3
			Drugs used for hyper-lipidemia Statins, fibrates, resins, …etc	1	3
			Drugs used for anemia Hematinics, folic acid, vit B12	1	3
			Mid-term exam	1	3
2	**Drugs for endocrine systems disorders**	a1, a2, a3, b1	Pituitary, hypothalamic, thyroid & parathyroid hormones GH, FSH, LH, ACTH, TSH, ..etc, T_3, T_4, calcitonin, parathormone, anti-thyroid drugs	1	3
			thyroid & parathyroid hormones T_3, T_4, anti-thyroid drugs	1	3
			Drugs used for diabetes mellitus Insulin, oral hypoglycemic drugs	1	3
			Sex hormones Female sex hormones , contraceptives	1	3
			Adrenal cortex hormones Glucocorticoids, other immunosuppressant drugs	1	3

			Drugs affecting bone, parathyroid hormones Drugs used for osteoporosis, calcitonin, parathormone, …etc	1	3
FINAL – EXAM				1	3
TOTAL				16	48

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to solve a list of problems related to advising healthcare of medicines use based comparison of drug benefits and risks for specific patients e.g. CVS patients, renal failure patients, etc.	b1, c1, d1	6-12	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b2
		Assignments	7, 12	10	10	b1, c1, d1
2	Mid-semester exam (written exam)		7	20	20	a1, a2, a3, b1
3	Final exam (written exam)		16	60	60	a1, a2, a3, b1
		TOTAL		100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Katzung –Basic and Clinical Pharmacology, 2013, McGraw-Hill

2- Essential References.

Richard A. Harvey. Lippincott's pharmacology, 2012, Lippincott William and Wilkins.

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/crisbertc/cardiovascular-drugs
2. https://www.slideshare.net/ameenharriss/endocrine-pharmacology-in-brief

X. Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PHYTOCHEMISTRY I

Course Code (**PHR414**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XXV. Course Identification and General Information:

15	**Course Title:**	**PHYTOCHEMISTRY I**			
15	**Course Code &Number:**	**PHR 414**			
15	**Credit hours:**	C.H			TOTAL
		L.	P.	T.	
		2	1	-	**3**
15	**Study level/ semester at which this course is offered:**	*(Fourth) Year – (1st) semester*			
15	**Pre –requisite (if any):**	**PHR322 (General Pharmacognosy II)**			
15	**Co –requisite (if any):**	**None**			
15	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
15	**Language of teaching the course:**	**ENGLISH**			
15	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**			
15	**Prepared by**				
16	**Date of Approval**				

L: lecturing ; P: practical ; T.: training

XXVI. Course Description:

Phytochemistry (I & II) courses are complement to the courses of (Pharmacognosy(I & II) as all deal with the plants as sources of drug and all are basis of evidence-based phytotherapy which is a significant part of complementary and alternative Medicine . Phytochemistry) I)course provide the student with knowledge and skills classification, extraction, isolation and the identification of the active chemical constituents (phytochemicals) present in the medicinal plants. This course concerns with 2 essential groups of phytochemicals: alkaloids, terpenoids while other phytochemicals will be covered in the next semester in (Phytochemistry II) course.

تعتبر مقررات كيمياء العقاقير (1و 2) مكملة لمقررات (علم العقاقير1 و 2) حيث تهتم جميعها بالنباتات كأحد مصادر الأدوية وجميعها تشكل ركيزة علمية مبنية على الأدلة للتداوي بالأعشاب والذي يعد جزءًا هاما من الطب التكميلي والبديل. يزود مقرر كيمياء العقاقير 1 الطالب بالمعرفة والمهارات في تصنيف واستخلاص وعزل و الكشف عن المركبات الفعالة الموجودة في النباتات الطبية. يهتم هذا المقرر بمجموعتين أساسيتين من تلك المركبات: القلويدات و مركبات التربينويد بينما سيتم تغطية بقية المركبات الفعالة في مقرر كيمياء العقاقير 2

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

42. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Explain the physicochemical properties of alkaloids and terpenoids phytochemicals.
A4	Describe analytical methods, principles, design and development techniques	**a2**. Discuss the methods and techniques used to extract and isolate phytochemicals
A6	Explain the basis of complementary and alternative medicines	**a3.** Define the botanical sources and therapeutic uses of alkaloids and terpenoids phytochemicals.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the role of pharmacist in extraction, isolation and identification of phytochemicals.
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Express the chemical structure of phytochemicals using drawings.
		b2. Differentiate between various types of alkaloids and terpenoids.
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3 .** Classify alkaloids and terpenoids.
		b4. Compare between different types of alkaloids and terpenoids
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b5.** Select standard operation procedure to extract, isolate and identify alkaloids and terpenoids in a plant sample
Professional and practical skills: upon completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
		c2. Operate the instruments and perform experiments successfully in the laboratory
C3	Screen for drugs from different sources and carry out pharmacy relevant	**c3.** Screen for alkalaoid and terpenoid drugs from plant sources.

	experiments successfully.	
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c4 .** Search efficiently for information using documented and electronic sources of information.
		c5. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

43. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) ofknowledge& understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the physicochemical properties of alkaloids and terpenoids phytochemicals.	**Active Lecture**	**Written exam s**
a2. Discuss the methods and techniques used to extract and isolate phytochemicals		
a3. Define the botanical sources and therapeutic uses of alkaloids and terpenoids phytochemicals.		
a4. Describe the role of pharmacist in extraction, isolation and identification of phytochemicals.		

(b) Alignment Course Intended Learning Outcomes (CILOs) ofIntellectual Skillsto Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Express the chemical structure of phytochemicals using drawings.	**Active Lecture, Feed-back learning**	**Written exams, quizzes**
b3 . Classify alkaloids and terpenoids.	**Active Lecture**	**Written exam s**
b2. Differentiate between various types of alkaloids and terpenoids.	**Lecture, lab. Practice**	**Written exam s, lab. term works, final practical exam**
b4. Compare between different types of alkaloids and terpenoids		
b5. Select standard operation procedure to extract, isolate and identify alkaloids and terpenoids in a plant sample		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3. Screen for alkalaoid and terpenoid drugs from plant sources.		
c4 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments,**

c5. Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skillsto Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group project**	**lab. term works, final practical exam, assignments**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Feed-back learning, lab. practice**	**Assignments, lab. term works, final practical exam,**

XL. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to phytochemistry**	a1, a2, a3, a4	□ Definition, brief history, types (conventional, medicinal) □ Scope of medicinal phytochemistry □ Phytochemicals : Definition , evolution process, clarification, chemical classification , physicochemical properties	1	2
2	**Extraction of phytochemicals**	a1, a2, a3, a4	**Extraction techniques** □ Maceration, percolation, soxhlet extractor: principle, apparatus, applications □ Spouted bed extraction □ Superficial fluid extraction □ Solid-phase microextraction	2	4

3	**Separation and isolation of phytochemicals**	a1, a2, a3, a4	**Sublimation , Distillation , Fractional liberation , Fractional crystallization :** principle, apparatus, applications **Chromatography** principle, brief history, types and selection of stationary phase and mobile phase, general factors affecting separation **adsorption chromatography**: **Thin layer chromatography** principle and procedures applications preparative TLC illustrative examples of phytochemicals isolated by TLC **partition chromatography: Paper chromatography**: principle , procedures and application **Simple Column chromatography**: Introduction and principle, components, procedures.	3	6
MID-TERM EXAM				1	2
4	**Alkaloids**	a1, a2, a3, a4, b1, b2, b3, b4, b5	Introduction:definition,history,occurrence,classification,nomenclature,physical and chemical properties, isolation, purification and detection. Phenylalkylamine alkaloids (ephedrine, cathinone and capsaicinoide) Isochinolin alkaloids(papaverine, morphine,codeine and emetine) Tropolon alkaloids(colchicines and demecolcine) Amaryllidaceen alkaloids(lycorine and galanthamin) Alkaloids derived from tryptophan Indol-alkaloids(physostigmine,carboline,ergoline,ajmalicine,yohimbine, ajmaline and strychnine type) Chinoline alkaloids(cinchona alkaloids) Alkaloids derived from histidine: (pilocarpine,isopilocarpine and pilosine)	4	8

			□ Alkaloids derived from asparagic acid :(ricinine and nicotine alkaloids) □ Alkaloids derived from lysine piperidine alkaloids(piper,lobelia and pomergranate alkaloids) □ chinolizidine alkaloids(lupinine,sparteine and cytosine) □ Alkaloids derived from ornithine:tropan alkaloids(atropine, hyoscyamine , scopolamine and cocaine)chinazoline alkaloids(tetradoxine) □ Alkaloids derived from glycine:purine alkaloids (caffeine,theophylline and theobromine)terpen alkaloids(monoterpen,sesquiterpen and diterpen alkaloids)		
5	**Terpenoids**	a1, a2, a3, a4, b1, b2, b3, b4, b5	□ Introduction (definition,classification,biosynthesis and distribution) □ Monoterpens (regular and irregular monoterpenoids,iridoids,structures,chemical and physical properties and drugs containing monoterpenoids) □ Sequiterpens and sequiterpens lactones(structures,chemical and biological properties and drug containing sequiterpens and sequiterpens lactones) □ Diterpenes(structures,chemical and biological properties and drug containing diterpenes) □ Triterpenes(classification,structures and drug containing triterpenes) Tetraterpenes(chemical and biological properties,vitamin A and drug containing tetraterpenes).	3	6
Course Review		a1, a2, a3, a4, b1, b2, b3, b4, b5	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2

TOTAL	16	32
Number of Weeks /and Units Per Semester	16 weeks	5 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
physicochemical properties , extraction (maceration or percolation or soxhlet extraction) , concentration (if necessary " rotary evaporation', isolation (Thin layer chromatography) and identification of the phytochemicals from crude drugs or parts of medicinal plants				
218.	alkaloids (Caffeine)	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
219.	alkaloids (Theophylline)	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
220.	alkaloids (cathinone)	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
221.	alkaloids (Trigonelline**)**	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
222.	alkaloids (vincristine **)**	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
223.	alkaloids (Capsaicin)	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
224.	Terpenoids : (Prenol)	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
225.	Terpenoids : (Eucalytol)	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
226.	Terpenoids : (Retinol)	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
227.	Terpenoids : (squalane)	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
228.	Review		**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
Total		**12**	**24**	

XLIV. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by usingtechniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XIII. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: each student will be assigned solve the problems provided by the teacher. The problems involve nomenclature, isolation , chemical reaction, etc.	c4, c5, d2	4-13	3
2	**Group** : each group of students will be assigned to present 2-3 videos or simulations of one of the studied extraction , isolation techniques.	c4, c5, d1, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1
		Assignments	7, 12	5	5	c4, c5, d1, d2, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2, a3, a4, b1, b2, b3, b4, b5
3	Final exam (written exam)		16	50	50	a1, a2, a3, a4, b1, b2, b3, b4, b5
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b2, b4, b5, c1, c2, c3, d1, d2, d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	b2, b4, b5, c1, c2, c3, d1, d2, d3
Total				30	30 %	

XLIV. Learning Resources:

1- Required Textbook(s) (maximum two).

Biren Shah and Avinash Seth ·Textbook of Pharmacognosy and Phytochemistry. 2018, Elsevier - Health Sciences Division.

2- Essential References.

Michael Heinrich , Joanne Barnes, et al. Fundamentals of Pharmacognosy and Phytotherapy, 2018, Elsevier.

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/wadekarpradnyap/basics-of-phytochemistry
2. https://www.slideshare.net/wadhavagurumeet/phytochemistry-250200811

XXXV. Course Policies:

111.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
112.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
113.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
114.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
115.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
116.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

PHYTOCHEMISTRY I

I. Course Identification and General Information:

1.	Course Title:	PHYTOCHEMISTRY I			
2.	Course Code &Number:	PHR 414			
3.	Credit hours:	C.H			TOTAL
		L.	P.	T.	
		2	1	-	3
4.	Study level/ semester at which this course is offered:	*(Fourth) Year – (1st) semester*			
5.	Pre –requisite (if any):	PHR322 (General Pharmacognosy II)			
6.	Co –requisite (if any):	None			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FACILITY			
10	Prepared by				
11	Date of Approval				

L: lecturing ; P: practical ; T.: training

II. Course Description:

Phytochemistry (I & II) courses are complement to the courses of (Pharmacognosy(I & II) as all deal with the plants as sources of drug and all are basis of evidence-based phytotherapy which is a significant part of complementary and alternative Medicine . Phytochemistry (I) course provide the student with knowledge and skills classification, extraction, isolation and the identification of the active chemical constituents (phytochemicals) present in the medicinal plants. This course concerns with 2 essential groups of phytochemicals : alkaloids, terpenoids while other phytochemicals will be covered in the next semester in (Phytochemistry II) course.

تعتبر مقررات كيمياء العقاقير (1و 2) مكملة لمقررات (علم العقاقير1 و 2) حيث تهتم جميعها بالنباتات كأحد مصادر الأدوية وجميعها تشكل ركيزة علمية مبنية على الأدلة للتداوي بالأعشاب والذي يعد جزءًا هاما من الطب التكميلي والبديل. يزود مقرر كيمياء العقاقير 1 الطالب بالمعرفة والمهارات في تصنيف واستخلاص وعزل و الكشف عن المركبات الفعالة الموجودة في النباتات الطبية. يهتم هذا المقرر بمجموعتين أساسيتين من تلك المركبات : القلويدات و مركبات التربينويد بينما سيتم تغطية بقية المركبات الفعالة في مقرر كيمياء العقاقير 2

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Explain the physicochemical properties of alkaloids and terpenoids phytochemicals.
A4	Describe analytical methods, principles, design and development techniques	**a2**. Discuss the methods and techniques used to extract and isolate phytochemicals
A6	Explain the basis of complementary and alternative medicines	**a3.** Define the botanical sources and therapeutic uses of alkaloids and terpenoids phytochemicals.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the role of pharmacist in extraction, isolation and identification of phytochemicals.
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Express the chemical structure of phytochemicals using drawings.
		b2. Differentiate between various types of alkaloids and terpenoids.
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3 .** Classify alkaloids and terpenoids.
		b4. Compare between different types of alkaloids and terpenoids
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b5.** Select standard operation procedure to extract, isolate and identify alkaloids and terpenoids in a plant sample
Professional and practical skills: upon completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
		c2. Operate the instruments and perform experiments successfully in the laboratory
C3	Screen for drugs from different sources and carry out pharmacy relevant experiments successfully.	**c3.** Screen for alkalaoid and terpenoid drugs from plant sources.

C7	Conduct research and utilize the results in different pharmaceutical fields.	**c4 .** Search efficiently for information using documented and electronic sources of information.
		c5. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) ofknowledge& understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the physicochemical properties of alkaloids and terpenoids phytochemicals.	**Active Lecture**	**Written exam s**
a2. Discuss the methods and techniques used to extract and isolate phytochemicals		
a3. Define the botanical sources and therapeutic uses of alkaloids and terpenoids phytochemicals.		
a4. Describe the role of pharmacist in extraction, isolation and identification of phytochemicals.		

(b) Alignment Course Intended Learning Outcomes (CILOs) ofIntellectual Skillsto Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Express the chemical structure of phytochemicals using drawings.	**Active Lecture, Feed-back learning**	**Written exams, quizzes**
b3 . Classify alkaloids and terpenoids.	**Active Lecture**	**Written exam s**
b2. Differentiate between various types of alkaloids and terpenoids.	**Lecture, lab. Practice**	**Written exam s, lab. term works, final practical exam**
b4. Compare between different types of alkaloids and terpenoids		
b5. Select standard operation procedure to extract, isolate and identify alkaloids and terpenoids in a plant sample		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3. Screen for alkalaoid and terpenoid drugs from plant sources.		
c4 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments,**

c5. Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skillsto Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group project**	**lab. term works, final practical exam, assignments**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Feed-back learning, lab. practice**	**Assignments, lab. term works, final practical exam,**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to phytochemistry**	a1, a2, a3, a4	□ Definition, brief history, types (conventional, medicinal) □ Scope of medicinal phytochemistry □ Phytochemicals : Definition , evolution process, clarification, chemical classification , physicochemical properties	1	2
2	**Extraction of phytochemicals**	a1, a2, a3, a4	**Extraction techniques** □ Maceration, percolation, soxhlet extractor: principle, apparatus, applications □ Spouted bed extraction □ Superficial fluid extraction □ Solid-phase microextraction	2	4
3	**Separation and isolation of phytochemicals**	a1, a2, a3, a4	**Sublimation , Distillation , Fractional liberation , Fractional crystallization :** principle, apparatus, applications □ **Chromatography** □ principle, brief history, types and selection of stationary phase and mobile phase, general factors affecting separation □ **adsorption chromatography**: **Thin layer chromatography** □ principle and procedures □ applications □ preparative TLC □ illustrative examples of phytochemicals isolated by TLC □ **partition chromatography: Paper chromatography**: principle , procedures and application □ **Simple Column chromatography**: Introduction and principle, components, procedures.	3	6

MID-TERM EXAM				1	2
4	**Alkaloids**	a1, a2, a3, a4, b1, b2, b3, b4, b5	Introduction:definition,history,occurrence,classification,nomenclature,physical and chemical properties, isolation, purification and detection. Phenylalkylamine alkaloids (ephedrine, cathinone and capsaicinoide) Isochinolin alkaloids(papaverine, morphine,codeine and emetine) Tropolon alkaloids(colchicines and demecolcine) Amaryllidaceen alkaloids(lycorine and galanthamin) Alkaloids derived from tryptophan Indol-alkaloids(physostigmine,carboline,ergoline,ajmalicine,yohimbine, ajmaline and strychnine type) Chinoline alkaloids(cinchona alkaloids) Alkaloids derived from histidine: (pilocarpine,isopilocarpine and pilosine) Alkaloids derived from asparagic acid :(ricinine and nicotine alkaloids) Alkaloids derived from lysine piperidine alkaloids(piper,lobelia and pomergranate alkaloids) chinolizidine alkaloids(lupinine,sparteine and cytosine) Alkaloids derived from ornithine:tropan alkaloids(atropine, hyoscyamine , scopolamine and cocaine)chinazoline alkaloids(tetradoxine) Alkaloids derived from glycine:purine alkaloids (caffeine,theophylline and theobromine)terpen alkaloids(monoterpen,sesquiterpen and diterpen alkaloids)	4	8
5	**Terpenoids**	a1, a2, a3, a4, b1, b2, b3, b4, b5	Introduction (definition,classification,biosynthesis and distribution)	3	

			□ Monoterpens (regular and irregular monoterpenoids,iridoids,structures,chemical and physical properties and drugs containing monoterpenoids) □ Sequiterpens and sequiterpens lactones(structures,chemical and biological properties and drug containing sequiterpens and sequiterpens lactones) □ Diterpenes(structures,chemical and biological properties and drug containing diterpenes) □ Triterpenes(classification,structures and drug containing triterpenes) Tetraterpenes(chemical and biological properties,vitamin A and drug containing tetraterpenes).		6
Course Review		a1, a2, a3, a4, b1, b2, b3, b4, b5	Review of the course topics by discussion session.	1	2
FINAL – EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	5 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
physicochemical properties , extraction (maceration or percolation or soxhlet extraction) , concentration (if necessary " rotary evaporation', isolation (Thin layer chromatography) and identification of the phytochemicals from crude drugs or parts of medicinal plants				
1.	alkaloids (Caffeine)	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
2.	alkaloids (Theophylline)	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
3.	alkaloids (cathinone)	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
4.	alkaloids (Trigonelline**)**	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
5.	alkaloids (vincristine **)**	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
6.	alkaloids (Capsaicin)	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
7.	Terpenoids : (Prenol)	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
8.	Terpenoids : (Eucalytol)	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
9.	Terpenoids : (Retinol)	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
10.	Terpenoids : (squalane)	**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
11.	Review		**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
Total		**12**	**24**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by usingtechniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: each student will be assigned solve the problems provided by the teacher. The problems involve nomenclature, isolation , chemical reaction, etc.	c4, c5, d2	4-13	3
2	**Group** : each group of students will be assigned to present 2-3 videos or simulations of one of the studied extraction , isolation techniques.	c4, c5, d1, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1
		Assignments	7, 12	5	5	c4, c5, d1, d2, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2, a3, a4, b1, b2, b3, b4, b5
3	Final exam (written exam)		16	50	50	a1, a2, a3, a4, b1, b2, b3, b4, b5
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b2, b4, b5, c1, c2, c3, d1, d2, d3
		Accomplishments		5	5	
2	Final exam (practical)		12	20	20	b2, b4, b5, c1, c2, c3, d1, d2, d3
Total				30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Biren Shah and Avinash Seth ·Textbook of Pharmacognosy and Phytochemistry. 2018, Elsevier - Health Sciences Division.

2- Essential References.

Michael Heinrich , Joanne Barnes, et al. Fundamentals of Pharmacognosy and Phytotherapy, 2018, Elsevier.

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/wadekarpradnyap/basics-of-phytochemistry
2. https://www.slideshare.net/wadhavagurumeet/phytochemistry-250200811

IX. Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

BIOPHARMACEUTICS & PHARMACOKINETICS II

Course Code (**PHR423**)

XXVII. Course Identification and General Information:

16	**Course Title:**	**BIOPHARMACEUTICS &PHARMACOKINETICS II**			
16	**Course Code &Number:**	**PHR423**			
16	**Credit hours:**	C.H			TOTAL
		L.	P.	T.	
		2	-	-	**2**
16	**Study level/ semester at which this course is offered:**	*(FOURTH) Year – (2ND) semester*			
16	**Pre –requisite (if any):**	**Pre : PHR411 (Biopharmaceutics & PHARMACOKINETICS I)**			
16	**Co –requisite (if any):**	**NONE**			
16	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
16	**Language of teaching the course:**	**ENGLISH**			
16	**Location of teaching the course:**	**At THE UNIVERSITY FACILITY**			
17	**Prepared by**				
17	**Date of Approval**				

L: lecturing ; P: practical ; T.: training

II. Course Description:

This course is complementary to (Biopharmaceutics and Pharmacokinetics I) course and both provide knowledge in drug pharmacokinetics and bioavailability. However, this course provides the student with the knowledge and skills required to use data, obtained from pharmacokinetic/biopharmaceutical studies, for mathematical calculations of drug concentrations in body and the rate and extent of drug absorption, distribution, elimination and drug dose required to achieve therapeutic concentration

هذه المقرر مكمل للمقررالسابق (الصيدلة الحيوية وحركية الدواء 1) ويوفر كلاهما المعرفة في الحركة الدوائية والتوافر الحيوي للدواء. يزود هذا المقرر الطالب بالمعرفة والمهارات اللازمة لاستخدام البيانات ، التي تم الحصول عليها من دراسات الحركة الدوائية / الصيدلانية الحيوية ، لحساب تراكيز الدواء في الجسم و التوافر الحيوي للدواء و سرعة كمية امتصاص و توزيع و استقلاب و اخراج الدواء و حساب الجرعات الدوائية للوصول الى التركيز العلاجي

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

44. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A4	Describe analytical methods, principles, design and development techniques	**a1.** Explain the procedures employed during pharmacokinetic/biopharmaceutical studies.
A10	Describe the pharmacists role in different pharmacy practices.	**a2.** Describe the role of pharmacistin determination of pharmacokinetic/biopharmaceutical parameters.
A12	Describe the methods of biostatistics and pharmaceutical calculations	**a3.**Explainthe basic mathematical principles of pharmacokinetic/biopharmaceutical calculations
		a4. Identify the order of changing drug amount in the body and the models of drug distribution
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the numerical and graphical data relevant to drug pharmacokinetic/biopharmaceutical
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b2 .** Apply mathematical and graphical rules solve pharmacokinetic/biopharmaceutical problems.
Professional and practical skills: upon completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Select properly pharmacokinetic equations, order and model to solve the pharmacokinetic problems
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Use scientific calculator/program to calculate pharmacokinetic parameters

C3	Screen for drugs from different sources and carry out pharmacy relevant experiments successfully.	**c3** .Carry out pharmacokinetic/biopharmaceutical calculations using order and models
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management , self-learning and problems solving
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.**Participate efficiently with his colleagues in a team work.

45. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the procedures employed during pharmacokinetic/biopharmaceutical studies.	**Active lecture**	**Written exam s**
a2. Describe the role of pharmacistin determination of pharmacokinetic/biopharmaceutical parameters.		
a3. Explainthe basic mathematical principles of pharmacokinetic/biopharmaceutical calculations		
a4. Identify the order of changing drug amount in the body and the models of drug distribution		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret the numerical and graphical data relevant to drug pharmacokinetic/biopharmaceutical	**Active-lecture, feed-back learning**	**Written exams , assignments , quizzes**
b2 . Apply mathematical and graphical rules solve pharmacokinetic/biopharmaceutical		

problems.		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Select properly pharmacokinetic equations, order and model to solve the pharmacokinetic problems	**Active lecture, Feed-back learning**	**Written exams , assignments , quizzes**
c2. Use scientific calculator/program to calculate pharmacokinetic parameters		
c3 . Carry out pharmacokinetic/biopharmaceutical calculations using order and models		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**Group project**	**assignment**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management , self-learning and problems solving	**Feed-back learning**	**Assignments**

XLI. Course Content:

Each topic, when applicable, is supported by Solved example problems and also problems to be solved as assignments

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction and Mathematical fundamentals**	a1, a2, a3, a4, b1, b2	• Definition and Objectives of pharmacokinetic and biopharmaceutical studies • Common logarithm (log) , natural logarithm (ln), base exponent (e-x) • XY data demonstration: tabular form, graphical form (semilog paper, rectangular coordinate paper), Straight line : general equation, determination of slope and rate constant graphically on, semilog paper, rectangular coordinate paper.	2	4
2	**Clinical aspects of Pharmacokinetic and biopharmaceutical studies**	a1, a2, a3, a4, b1, b2	• **Subjects :** Volunteers specifications: number, gender, weight, height, body surface area, race • **Drug Dosing :** drug administration, water intake, fed/fasting states. • **Post-dosing:** 1- Sampling: blood, urine , others (advantages, disadvantage), interval of sampling, considerations of sampling. 2- Analysis of sample	1	2
3	**Determination of cumulative drug eliminated in urine**	a1, a2, a3, a4, b1, b2	**Analysis of urine samples: urine data:** time of sampling virus Amount excreted at a time (D_t), cumulative amount of drug excreted at a time (Du), excretion rate ($D_t/\Delta t$), total cumulative amount of drug excreted 0- ∞ (Du∞), Graphical methods	2	4

4	**Order of kinetics and Pharmacokinetics Models**	a1, a2, a3, a4, b1, b2	**The order of kinetic :**definition of kinetic order, significance and types (first order, zero order), mathematical and graphical determination. **Pharmacokinetic models of distribution** Definition of model, significance, types (one-compartment, two compartments, three compartment) and principle of each model, graphical and mathematical determination.	3	6
Mid-term exam				1	2
5	**Pharmacokinetics of drugs given by intravenous(bolus) administration**	a1, a2, a3, a4, b1, b2	**I.V. Bolus** **From Blood data (Cp vs time)** 1- Determine model and order of kinetic 2- General equations of Cp and $Cp^0$for one-compartment model, two compartment model and three compartment model 3- Determine other parameters: elimination rate constant,half-life ($t_{1/2}$), clearance (Cl) distribution rate constant, AUC^{∞}**,** **Distribution:**volume of distribution (VD)	2	4
6	**Pharmacokinetics of drugs given by intravenous infusion**	a1, a2, a3, a4, b1, b2	**I.V. multiple bolus dosing :** One-compartment assuming first order elimination , general equation of Cp, Determine Cp^0 , determine distribution and elimination parameters, determine specific data (Cmax, Cmin, Cmax∞, Cmin∞, CP∞, Css)	2	

			I.V. infusion: one-compartment model at constant infusion rate: General equation of Cp, specific data (rate of infusion(R), steady state concentration Css, maintenance dose Dm, loading dose D_L) , determine distribution and elimination parameters. **I.V. infusion: one-compartment model at changing infusion rate:** General equation of Cp, specific data (rate of infusion(R), steady state concentration Css, maintenance dose Dm, loading dose D_L), determine distribution and elimination parameters. **I.V. bolus followed by IV. infusion:** General equation of Cp, specific data (rate of infusion(R), steady state concentration Css, maintenance dose Dm, loading dose D_L), determine distribution and elimination parameters.:		4
7	**Pharmacokinetics of single dose of given by extravascular (oral, I.M., rectal , etc.)**	a1, a2, a3, a4, b1, b2	**Blood data** • Cp versus time curve • General equation of Cp • **Absorption parameters:**Ka, F, Cmax, Tmax Dab, Dab∞, *f*ab (fraction absorbed) , *f*ua (fraction unabsorbed), • **Elimination parameters:** k, half-life , Cl **Urine data** • One-compartment : first-order elimination, zero order elimination, ARE versus time	2	4
8	**Pharmacokinetics of multiple dosing of drug given by extravascular (oral, I.M., rectal , etc.)**	a1, a2, a3, a4, b1, b2	• One-compartment assuming firstorder elimination: (Cmax, Cmin, Cmax∞, Cmin∞, CP∞, CSS,)	1	2

9	**Specific Pharmacokinetics calculations**	a1, a2, a3, a4, b1, b2	**Calculations of :** • Loading and maintenance doses • Doses and dosage interval at change from I.V. infusion to oral administration. • Changes in plasma concentration with change in route of administration. • Dose in the elderly	1	2
10	**Calculation of bioavailability and bioequivalence**	a1, a2, a3, a4, b1, b2	• Absolute bioavailability • Relative bioavailability • Determination of Bioequivalence • IVIV correlation calculations	1	2
FINAL – EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	10 Units

XLV. Teaching strategies of the course:

Active lecture - Discussion: a short lecture/ address followed by discussion
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XLII. Assignments:

No	Assignments	Aligned CILOs	Week Due	Marks
1	**Individual**: A number of problems related to the topics will be answered as homework exercises	b2, c3, d2	2-12	5
	Group: Each group will be assigned to collect pharmacokinetic data of a specific drug and justify those data based on pharmacokinetic order, model and equations	b2, c3, d2	2-12	5

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b2
		Assignments	7, 12	10	10	b2, c3, d2
2	Mid-semester exam (written exam)		20	20	20	a1, a2, a3, a4, b1, b2
3	Final exam (written exam)		60	60	60	a1, a2, a3, a4, b1, b2
			TOTAL	100	100 %	

XLV.Learning Resources:

1- Required Textbook(s) (maximum two).

22. Shargel. Biopharmaceutics and pharmacokinetics, 2012, McGraw Hill Inc

2- Essential References.

Malcolm Rowland. Clinical pharmacokinetics: concepts an applications, 1996, Lippincott's Williams & Wilkins

3- Electronic Materials and Web Sites *etc*.

5. https://www.slideshare.net/arijabuhaniyeh/pharmacokinetics-biopharmaceutics-introduction
6. https://www.slideshare.net/SURYAKANTVERMA2/biopharmaceutics-mechanisms-of-drug-absorption

XXXVI. Course Policies:	
117.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
118.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
119.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
120.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
121.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
122.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Course Plan (Syllabus) of

BIOPHARMACEUTICS &PHARMACOKINETICS II

I. Course Identification and General Information:

1.	Course Title:	BIOPHARMACEUTICS &PHARMACOKINETICS II			
2.	Course Code &Number:	PHR423			
3.	Credit hours:	C.H			TOTAL
		L.	P.	T.	
		2	-	-	**2**
4.	Study level/ semester at which this course is offered:	*(FOURTH) Year – (2ND) semester*			
5.	Pre –requisite (if any):	**Pre : PHR411 (Biopharmaceutics & PHARMACOKINETICS I)**			
6.	Co –requisite (if any):	**NONE**			
7.	Program (s) in which the course is offered:	**Pharmacy Bachelor**			
8.	Language of teaching the course:	**ENGLISH**			
9.	Location of teaching the course:	**At THE UNIVERSITY FACILITY**			
10	Prepared by				
11	Date of Approval				

L: lecturing ; P: practical ; T.: training

II. Course Description:

This course is complementary to (Biopharmaceutics and Pharmacokinetics I) course and both provide knowledge in drug pharmacokinetics and bioavailability. However, this course provides the student with the knowledge and skills required to use data, obtained from pharmacokinetic/biopharmaceutical studies, for mathematical calculations of drug concentrations in body and the rate and extent of drug absorption, distribution, elimination and drug dose required to achieve therapeutic concentration

هذه المقرر مكمل للمقرر السابق (الصيدلة الحيوية وحركية الدواء 1) ويوفر كلاهما المعرفة في الحركة الدوائية والتوافر الحيوي للدواء. يزود هذا المقرر الطالب بالمعرفة والمهارات اللازمة لاستخدام البيانات ، التي تم الحصول عليها من دراسات الحركة الدوائية / الصيدلانية الحيوية ، لحساب تراكيز الدواء في الجسم و التوافر الحيوي للدواء و سرعة كمية امتصاص و توزيع و استقلاب و اخراج الدواء و حساب الجرعات الدوائية للوصول الى التركيز العلاجي

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A4	Describe analytical methods, principles, design and development techniques	**a1.** Explain the procedures employed during pharmacokinetic/biopharmaceutical studies.
A10	Describe the pharmacists role in different pharmacy practices.	**a2.** Describe the role of pharmacist in determination of pharmacokinetic/biopharmaceutical parameters.
A12	Describe the methods of biostatistics and pharmaceutical calculations	**a3.**Explainthe basic mathematical principles of pharmacokinetic/biopharmaceutical calculations
		a4. Identify the order of changing drug amount in the body and the models of drug distribution
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the numerical and graphical data relevant to drug pharmacokinetic/biopharmaceutical
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b2 .** Apply mathematical and graphical rules solve pharmacokinetic/biopharmaceutical problems.
Professional and practical skills: upon completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Select properly pharmacokinetic equations, order and model to solve the pharmacokinetic problems
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Use scientific calculator/program to calculate pharmacokinetic parameters

C3	Screen for drugs from different sources and carry out pharmacy relevant experiments successfully.	**c3** .Carry out pharmacokinetic/biopharmaceutical calculations using order and models
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management , self-learning and problems solving
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.**Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the procedures employed during pharmacokinetic/biopharmaceutical studies.	**Active lecture**	**Written exam s**
a2. Describe the role of pharmacist in determination of pharmacokinetic/biopharmaceutical parameters.		
a3. Explainthe basic mathematical principles of pharmacokinetic/biopharmaceutical calculations		
a4. Identify the order of changing drug amount in the body and the models of drug distribution		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret the numerical and graphical data relevant to drug pharmacokinetic/biopharmaceutical	**Active-lecture, feed-back learning**	**Written exams , assignments , quizzes**

b2 . Apply mathematical and graphical rules solve pharmacokinetic/biopharmaceutical problems.		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Select properly pharmacokinetic equations, order and model to solve the pharmacokinetic problems	**Active lecture, Feed-back learning**	**Written exams , assignments , quizzes**
c2. Use scientific calculator/program to calculate pharmacokinetic parameters		
c3 . Carry out pharmacokinetic/biopharmaceutical calculations using order and models		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**Group project**	**assignment**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management , self-learning and problems solving	**Feed-back learning**	**Assignments**

IV. Course Content:

Each topic, when applicable, is supported by Solved example problems and also problems to be solve as assignment

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction and Mathematical fundamentals**	a1, a2, a3, a4, b1, b2	• Definition and Objectives of pharmacokinetic and biopharmaceutical studies • Common logarithm (log) , natural logarithm (ln), base exponent (e-x) • XY data demonstration: tabular form, graphical form (semilog paper, rectangular coordinate paper), Straight line : general equation, determination of slope and rate constant graphically on, semilog paper, rectangular coordinate paper.	2	4
2	**Clinical aspects of Pharmacokinetic and biopharmaceutical studies**	a1, a2, a3, a4, b1, b2	• **Subjects :** Volunteers specifications: number, gender, weight, height, body surface area, race • **Drug Dosing :** drug administration, water intake, fed/fasting states. • **Post-dosing:** 3- Sampling: blood, urine , others (advantages, disadvantage), interval of sampling, considerations of sampling. 4- Analysis of sample	1	2
3	**Determination of cumulative drug eliminated in urine**	a1, a2, a3, a4, b1, b2	**Analysis of urine samples: urine data:** time of sampling virus Amount excreted at a time (D_t), cumulative amount of drug excreted at a time (Du), excretion rate ($D_t/\Delta t$), total cumulative amount of drug excreted 0- ∞ (Du∞), Graphical methods	2	4

4	**Order of kinetics and Pharmacokinetics Models**	a1, a2, a3, a4, b1, b2	**The order of kinetic :**definition of kinetic order, significance and types (first order, zero order), mathematical and graphical determination. **Pharmacokinetic models of distribution** Definition of model, significance, types (one-compartment, two compartments, three compartment) and principle of each model, graphical and mathematical determination.	3	6
Mid-term exam				1	2
5	**Pharmacokinetics of drugs given by intravenous(bolus) administration**	a1, a2, a3, a4, b1, b2	**I.V. Bolus** **From Blood data (Cpvs time)** 1- Determine model and order of kinetic 2- General equations of Cp and $Cp^0$for one-compartment model, two compartment model and three compartment model 3- Determine other parameters: elimination rate constant,half-life ($t_{1/2}$), clearance (Cl) distribution rate constant, AUC^{∞}**,** **Distribution:** volume of distribution (VD)	2	4
6	**Pharmacokinetics of drugs given by intravenous infusion**	a1, a2, a3, a4, b1, b2	**I.V. multiple bolus dosing :** One-compartment assuming first order elimination , general equation of Cp, Determine Cp^0 , determine distribution and elimination parameters, determine specific data (Cmax, Cmin, Cmax∞, Cmin∞, CP∞, Css)	2	4

			I.V. infusion: one-compartment model at constant infusion rate: General equation of Cp, specific data (rate of infusion(R), steady state concentration Css, maintenance dose Dm, loading dose D_L) , determine distribution and elimination parameters. **I.V. infusion: one-compartment model at changing infusion rate:** General equation of Cp, specific data (rate of infusion(R), steady state concentration Css, maintenance dose Dm, loading dose D_L), determine distribution and elimination parameters. **I.V. bolus followed by IV. infusion:** General equation of Cp, specific data (rate of infusion(R), steady state concentration Css, maintenance dose Dm, loading dose D_L), determine distribution and elimination parameters.:		
7	**Pharmacokinetics of single dose of given by extravascular (oral, I.M., rectal , etc.)**	a1, a2, a3, a4, b1, b2	**Blood data** • Cp versus time curve • General equation of Cp • **Absorption parameters:**Ka, F, Cmax, Tmax Dab, Dab∞, *f*ab (fraction absorbed) , *f*ua (fraction unabsorbed), • **Elimination parameters:** k, half-life , Cl **Urine data** • One-compartment : first-order elimination, zero order elimination, ARE versus time	2	4
8	**Pharmacokinetics of multiple dosing of drug given by extravascular (oral, I.M., rectal , etc.)**	a1, a2, a3, a4, b1, b2	• One-compartment assuming firstorder elimination: (Cmax, Cmin, Cmax∞, Cmin∞, CP∞, CSS,)	1	2

9	**Specific Pharmacokinetics calculations**	a1, a2, a3, a4, b1, b2	**Calculations of :** • Loading and maintenance doses • Doses and dosage interval at change from I.V. infusion to oral administration. • Changes in plasma concentration with change in route of administration. • Dose in the elderly	1	2
10	**Calculation of bioavailability and bioequivalence**		• Absolute bioavailability • Relative bioavailability • Determination of Bioequivalence • IVIV correlation calculations	1	2
FINAL – EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	10 Units

V. Teaching strategies of the course:

Active lecture - Discussion: a short lecture/ address followed by discussion
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Marks
1	**Individual**: A number of problems related to the topics will be answered as homework exercises	b2, c3, d2	2-12	5
	Group: Each group will be assigned to collect pharmacokinetic data of a specific drug and justify those data based on pharmacokinetic order, model and equations	b2, c3, d2	2-12	5

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	10	4-13, 14	10	10	b2
		10	7, 12	10	10	b2, c3, d2
2	Mid-semester exam (written exam)		20	20	20	a1, a2, a3, a4, b1, b2
3	Final exam (written exam)		60	60	60	a1, a2, a3, a4, b1, b2
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Shargel. Biopharmaceutics and pharmacokinetics, 2012, McGraw Hill Inc

2- Essential References.

Malcolm Rowland. Clinical pharmacokinetics: concepts an applications, 1996, Lippincott's Williams & Wilkins

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/arijabuhaniyeh/pharmacokinetics-biopharmaceutics-introduction
2. https://www.slideshare.net/SURYAKANTVERMA2/biopharmaceutics-mechanisms-of-drug-absorption

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

HOSPITAL PHARMACY

Course Code (**PHR426**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XXVIII. Course Identification and General Information:

17	Course Title:	HOSPITAL PHARMACY			
17	Course Code &Number:	PHR 426			
17	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		2	-	-	**2**
17	Study level/ semester at which this course is offered:	*(4th) Year – (2nd) semester*			
17	Pre –requisite (if any):	-			
17	Co –requisite (if any):	PHR423 (Biopharmaceutics and pharmacokinetics II)			
17	Program (s) in which the course is offered:	Pharmacy Bachelor			
17	Language of teaching the course:	ENGLISH			
18	Location of teaching the course:	AT THE UNIVERSITY FACILITY			
18	Prepared by				
18	Date of Approval				

L: lecturing ; P: practical ; T.: training

XXIX. Course Description:

This course provides the students with essential knowledge and skills necessary to effectively and ethically perform missions of hospital pharmacist in healthcare facilities. The missions include, for instance, affording pharmaceutical care services to in-patient and out-patients , management of the hospital pharmacy , medical stores and medical supply administration, participation in the drug and therapeutics committee and education of patients and healthcare professionals in rational use of medications. The course is co-requisite with (Pharmacy II) training that involve visits to a local hospital der in order to link the theoretical aspects of the course to actual-field practice.

يزود هذا المقرر الطلاب بالمعرفة والمهارات الأساسية اللازمة لأداء مهام صيدلي المستشفى بشكل فعال وأخلاقي في مرافق الرعاية الصحية. تشمل المهام ، على سبيل المثال ، تقديم خدمات الرعاية الصيدلانية للمرضى الداخليين والخارجيين ، وإدارة صيدلية المستشفى ، والمخازن الطبية وإدارة الإمدادات الطبية ، والمشاركة في لجنة الأدوية والعلاجات ، وتثقيف المرضى والمتخصصين في الرعاية الصحية في الاستخدام الرشيد من الأدوية. تعد الدورة التدريبية متطلبًا مشتركًا مع تدريب الصيدلة-2الذي يتضمن زيارات إلى أحد المستشفيات المحلية من أجل ربط الجوانب النظرية للدورة التدريبية بالممارسة الميدانية الفعلية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

46. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A9	Define the basis of health policy, Pharmacoeconomics, pharmacoepidemology , pharmaceutical marketing and administration.	**a1.** Explain the regulations and polices employed in hospital pharmacy practice.
A10	Describe the pharmacists role in different pharmacy practices.	**a2**. Describe the role of hospital pharmacists in providing services to in-patients and outpatients in the healthcare facilities.
A12	Describe the methods of biostatistics and pharmaceutical calculations	**a3.** Describe the methods of calculations relevant to hospital pharmacy practice.
Intellectual skills: upon completion of the course, students will be able to:		
B5	Plan a modern system for administration of foundations and merge ethics to business in drug marketing.	**b1.** Plan a modern system to manage the hospital pharmacy and manage medical stores and medical supply administration.
B7	Formulate and evaluate patient care plan about rational drug use of medications.	**b2.** Review and evaluate prescriptions and patient`s medication record to improve patient safety and medication efficacy.
B8	Use appropriate research methods including experimental, observational and electronic to collect data and solve problems.	**b3.** Apply calculations in preparation of extemporaneous preparations including IV-admixtures and TPN and to modify dose for children, renal failure and obese patients.
Professional and practical skills: upon completion of the course, students will be able to:		
C4	Advice patients and healthcare professionals to optimize medicines use.	**c1.** Advise patients and healthcare professionals to optimize medicines use.
C5	Employ the relevant ways to produce extemporaneous preparations including TPN and IV admixtures.	**c2.** Employ the relevant way to prepare extemporaneous preparations including IV-admixtures and TPN.
C6	Apply administrative and	**c3.** Apply administrative rules in hospital

	Pharmacoeconomics rules in pharmacy and ethically use marketing skills for drug promotion.	pharmacy practice.
Transferable skills: upon completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate time management, problem-solving and self-learning skills.
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d2.** Take responsibility of adaption to change needs in hospital pharmacy practice.
D5	Retrieve essential references of evidence-based to achieve maximal clinical effectiveness	**d3.** Retrieve evidence-based references to achieve maximal clinical efficacy.

47. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the regulations and polices employed in hospital pharmacy practice.	**Active Lecture**	**Written exams**
a2. Describe the role of hospital pharmacists in providing services to in-patients and outpatients in the healthcare facilities.		
a3. Describe the methods of calculations relevant to hospital pharmacy practice.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Plan a modern system to manage the hospital pharmacy and manage medical stores and medical supply administration.	**Active Lecture, feed-back learning**	**Written exams , quizzes, assignment**
b3. Apply calculations in preparation of extemporaneous preparations including IV-admixtures and TPN and to modify dose for children, renal failure and obese patients.		
b2. Review and evaluate prescriptions and patient`s medication record to improve patient safety and medication efficacy.	**feed-back learning**	**Assignment**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Advise patients and healthcare professionals to optimize medicines use.	**Feed-back learning,**	**Quizzes**
c2. Employ the relevant way to prepare extemporaneous preparations including IV-admixtures and TPN.		
c3. Apply administrative rules in hospital pharmacy practice.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate time management, problem-solving and self-learning skills.	**Feed-back learning**	**Assignments**
d3. Retrieve evidence-based references to achieve maximal clinical efficacy.		
d2. Take responsibility of adaption to change needs in hospital pharmacy practice.	**Feed-back learning**	**Quizzes**

XLII. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, a2, a3, b1, b3	• definition of hospital, hospital pharmacy hospital pharmacists • difference between community, clinical and hospital pharmacy. • Objectives and responsibilities of hospital pharmacists • Missions of hospital pharmacists • Risks of hospital pharmacy practice • Complexity of hospital pharmacy practice • requirements of a pharmacist to practice	1	2
2	**Organization and management of hospital pharmacy**	a1, a2, a3, b1, b3	• Physical organization: location, area, interior design • Personnel (Staff) organization • Drugs and therapeutics committee (DTC): members, missions, meetings, budget plan and implantation • Hospital formulary : components, missions	1	2
3	**Medical supply, stores and control**	a1, a2, a3, b1, b3	• The structure of medical supply administration • Types and goals and controlling systems in medical supply administration • Systems controlling Flow of medications • Regulations of medications Receiving process • Regulations of medical stores • Principles of issuing medications • Procedure and measures of safety in medical stores • Controlling of leakage of medications	2	4

4	**Specific drug products in the hospital**	a1, a2, a3, b1, b3	Types, examples, Regulation and specific store and dispensing rules of: o Emergency medications o Pre-operative and operative medications o Controlled drugs	1	2
5	**In-patient services (1)**	a1, a2, a3, b1, b3	**1- Distribution of medications to in-patients (Drug distribution systems): mechanism,** advantages and disadvantages of floor (ward) stock system, individual prescription system, combined system, unit dose system (procedures). **2- Wards inspection services** 3- **After-hours pharmacy services**	1	2
MID-TERM EXAM				1	2
5	**In-patient services (2)**	a1, a2, a3, b1, b3	**4- Extemporaneous preparations in hospital** (i) Non-sterile: repacking, preparations from raw materials, preparations from available dosage forms (ii) Sterile requirements: aseptic conditions, laminar air flow (iii) IV-admixtures: definition, components, advantages, disadvantages, incompatibility problem (iv) IV-mixtures of electrolytes: calculations and preparation of IV electrolyte salt required daily: calcium, sodium, magnesium, potassium , iron (v) Total parenteral nutrition (TPN): definition, components, indications, calculation of daily requirement of water, lipid, protein and carbohydrates, vitamins.	3	6
5	**In-patient services (3)**	a1, a2, a3, b1, b3	**5- Clinical missions of hospital pharmacist** (i) Checking of prescribed medications (ii) Review patient medication record (iii) Dose adjustment: children, renal failure patients,	2	4

			underweight/overweigh obese/t patient (iv) Drug therapy monitoring		
6	**Outpatient services**	a1, a2, a3, b1, b3	1- Dispensing of medications to outpatients: types of prescriptions, data in prescriptions, checking errors 2- Patient counseling and education 3- Health promotion: family planning, smoking cessation	1	2s
7	**Educative, training and research missions of hospital pharmacists**	a1, a2, a3, b1, b3	○ Education of healthcare professionals about rational drug use ○ Training of undergraduate and pharmacy technicians ○ Research aspects in hospital pharmacy	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

XLVI. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficienc4 of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

XLIII. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to execute the following homework tasks 1- Review and evaluate patient1s medication record 2- Solve problems related to hospital practice The teacher provide the student with those records and problems	b2, b3, d1, d3	4-13	10

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13	10	10	b1, b3, d2
		Assignments	4-13	10	10	b2, b3, d1, d3
2	Mid-semester exam of theoretical part (written exam		7	20	20	a1, a2, a3, b1, b3
3	Final exam of theoretical part (written exam)		16	60	60	a1, a2, a3, b1, b3
			TOTAL	100	100 %	

XLVI. Learning Resources:

1- Required Textbook(s) (maximum two).

23. Martin Stephens. Hospital pharmacy. 2nd Edition, Pharmaceutical press.

2- Essential References.

1. Paradkar. Hospital and clinical pharmacy
2. Qadry. A text book of hospital pharmacy
3. Mark Jackson, Andrew Lowey. Handbook of extemporaneous preparation, The NHS Pharmaceutical Quality Assurance Committee, pharmaceutical press.

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/zulfiquer732/hospital-pharmacy-95835648
2. https://www.slideshare.net/arthamrajashekar/organization-of-hospital-pharmacy-slides

XXXVII. Course Policies:	
123.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
124.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
125.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
126.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
127.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
128.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

HOSPITL PHARMACY

I. Course Identification and General Information:

1.	Course Title:	HOSPITAL PHARMACY			
2.	Course Code &Number:	PHR426			
3.	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		2	-	-	**2**
4.	Study level/ semester at which this course is offered:	*(4th) Year – (2nd) semester*			
5.	Pre –requisite (if any):	-			
6.	Co –requisite (if any):	PHR423 (Biopharmaceutics and pharmacokinetics II)			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FACILITY			
10	Prepared by				
11	Date of Approval				

II. Course Description:

This course provides the students with essential knowledge and skills necessary to effectively and ethically perform missions of hospital pharmacist in healthcare facilities. The missions include, for instance, affording pharmaceutical care services to in-patient and out-patients , management of the hospital pharmacy , medical stores and medical supply administration, participation in the drug and therapeutics committee and education of patients and healthcare professionals in rational use of medications. The course is co-requisite with (Pharmacy II) training that involve visits to a local hospital der in order to link the theoretical aspects of the course to actual-field practice.

يزود هذا المقرر الطلاب بالمعرفة والمهارات الأساسية اللازمة لأداء مهام صيدلي المستشفى بشكل فعال وأخلاقي في مرافق الرعاية الصحية. تشمل المهام ، على سبيل المثال ، تقديم خدمات الرعاية الصيدلانية للمرضى الداخليين والخارجيين ، وإدارة صيدلية المستشفى ، والمخازن الطبية وإدارة الإمدادات الطبية ، والمشاركة في لجنة الأدوية والعلاجات ، وتثقيف المرضى والمتخصصين في الرعاية الصحية في الاستخدام الرشيد من الأدوية. تعد الدورة التدريبية متطلبًا مشتركًا مع تدريب الصيدلة-2الذي يتضمن زيارات إلى أحد المستشفيات المحلية من أجل ربط الجوانب النظرية للدورة التدريبية بالممارسة الميدانية الفعلية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A9	Define the basis of health policy, Pharmacoeconomics, pharmacoepidemology , pharmaceutical marketing and administration.	**a1.** Explain the regulations and polices employed in hospital pharmacy practice.
A10	Describe the pharmacists role in different pharmacy practices.	**a2**. Describe the role of hospital pharmacists in providing services to in-patients and outpatients in the healthcare facilities.
A12	Describe the methods of biostatistics and pharmaceutical calculations	**a3.** Describe the methods of calculations relevant to hospital pharmacy practice.
Intellectual skills: upon completion of the course, students will be able to:		
B5	Plan a modern system for administration of foundations and merge ethics to business in drug marketing.	**b1.** Plan a modern system to manage the hospital pharmacy and manage medical stores and medical supply administration.
B7	Formulate and evaluate patient care plan about rational drug use of medications.	**b2.** Review and evaluate prescriptions and patient`s medication record to improve patient safety and medication efficacy.
B8	Use appropriate research methods including experimental, observational and electronic to collect data and solve problems.	**b3.** Apply calculations in preparation of extemporaneous preparations including IV-admixtures and TPN and to modify dose for children, renal failure and obese patients.
Professional and practical skills: upon completion of the course, students will be able to:		
C4	Advice patients and healthcare professionals to optimize medicines use.	**c1.** Advise patients and healthcare professionals to optimize medicines use.
C5	Employ the relevant ways to produce extemporaneous preparations including TPN and IV admixtures.	**c2.** Employ the relevant way to prepare extemporaneous preparations including IV-admixtures and TPN.
C6	Apply administrative and	**c3.** Apply administrative rules in hospital

	Pharmacoeconomics rules in pharmacy and ethically use marketing skills for drug promotion.	pharmacy practice.
Transferable skills: upon completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate time management, problem-solving and self-learning skills.
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d2.** Take responsibility of adaption to change needs in hospital pharmacy practice.
D5	Retrieve essential references of evidence-based to achieve maximal clinical effectiveness	**d3.** Retrieve evidence-based references to achieve maximal clinical efficacy.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the regulations and polices employed in hospital pharmacy practice.	**Active Lecture**	**Written exams**
a2. Describe the role of hospital pharmacists in providing services to in-patients and outpatients in the healthcare facilities.		
a3. Describe the methods of calculations relevant to hospital pharmacy practice.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Plan a modern system to manage the hospital pharmacy and manage medical stores and medical supply administration.	**Active Lecture, feed-back learning**	**Written exams , quizzes, assignment**
b3. Apply calculations in preparation of extemporaneous preparations including IV-		

admixtures and TPN and to modify dose for children, renal failure and obese patients.		
b2. Review and evaluate prescriptions and patient`s medication record to improve patient safety and medication efficacy.	**feed-back learning**	**Assignment**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Advise patients and healthcare professionals to optimize medicines use.	**Feed-back learning,**	**Quizzes**
c2. Employ the relevant way to prepare extemporaneous preparations including IV-admixtures and TPN.		
c3. Apply administrative rules in hospital pharmacy practice.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate time management, problem-solving and self-learning skills.	**Feed-back learning**	**Assignments**
d3. Retrieve evidence-based references to achieve maximal clinical efficacy.		
d2. Take responsibility of adaption to change needs in hospital pharmacy practice.	**Feed-back learning**	**Quizzes**

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, a2, a3, b1, b3	• definition of hospital, hospital pharmacy hospital pharmacists • difference between community, clinical and hospital pharmacy. • Objectives and responsibilities of hospital pharmacists • Missions of hospital pharmacists • Risks of hospital pharmacy practice • Complexity of hospital pharmacy practice • requirements of a pharmacist to practice	1	2
2	**Organization and management of hospital pharmacy**	a1, a2, a3, b1, b3	• Physical organization: location , area, interior design • Personnel (Staff) organization • Drugs and therapeutics committee (DTC): members, missions, meetings, budget plan and implantation • Hospital formulary : components, missions	1	2
3	**Medical supply, stores and control**	a1, a2, a3, b1, b3	• The structure of medical supply administration • Types and goals and controlling systems in medical supply administration • Systems controlling Flow of medications • Regulations of medications Receiving process • Regulations of medical stores • Principles of issuing medications • Procedure and measures of safety in medical stores • Controlling of leakage of medications	2	4

4	**Specific drug products in the hospital**	a1, a2, a3, b1, b3	Types, examples, Regulation and specific store and dispensing rules of : o Emergency medications o Pre-operative and operative medications o Controlled drugs	1	2
5	**In-patient services (1)**	a1, a2, a3, b1, b3	**6- Distribution of medications to in-patients (Drug distribution systems): mechanism,** advantages and disadvantages of floor (ward) stock system, individual prescription system, combined system, unit dose system (procedures). **7- Wards inspection services** 8- **After-hours pharmacy services**	1	2
MID-TERM EXAM				1	2
5	**In-patient services (2)**	a1, a2, a3, b1, b3	**9- Extemporaneous preparations in hospital** (vi) Non-sterile : repacking, preparations from raw materials, preparations from available dosage forms (vii) Sterile requirements: aseptic conditions, laminar air flow (viii) IV-admixtures: definition, components, advantages, disadvantages, incompatibility problem (ix) IV-mixtures of electrolytes: calculations and preparation of IV electrolyte salt required daily: calcium, sodium, magnesium, potassium , iron (x) Total parenteral nutrition (TPN): definition, components, indications, calculation of daily requirement of water, lipid, protein and carbohydrates, vitamins.	3	6
5	**In-patient services (3)**	a1, a2, a3, b1, b3	**10- Clinical missions of hospital pharmacist** (v) Checking of prescribed medications (vi) Review patient medication record (vii) Dose adjustment: children, renal failure patients,	2	4

			underweight/overweigh obese/t patient (viii) Drug therapy monitoring		
6	**Outpatient services**	a1, a2, a3, b1, b3	4- Dispensing of medications to outpatients: types of prescriptions, data in prescriptions, checking errors 5- Patient counseling and education 6- Health promotion: family planning, smoking cessation	1	2s
7	**Educative, training and research missions of hospital pharmacists**	a1, a2, a3, b1, b3	○ Education of healthcare professionals about rational drug use ○ Training of undergraduate and pharmacy technicians ○ Research aspects in hospital pharmacy	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficienc4 of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to execute the following homework tasks 1- Review and evaluate patient1s medication record 2- Solve problems related to hospital practice The teacher provide the student with those records and problems	b2, b3, d1, d3	4-13	10

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13	10	10	b1, b3, d2
		Assignments	4-13	10	10	b2, b3, d1, d3
2	Mid-semester exam of theoretical part (written exam		7	20	20	a1, a2, a3, b1, b3
3	Final exam of theoretical part (written exam)		16	60	60	a1, a2, a3, b1, b3
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Martin Stephens. Hospital pharmacy. 2nd Edition, Pharmaceutical press.

2- Essential References.

1. Paradkar. Hospital and clinical pharmacy
2. Qadry. A text book of hospital pharmacy
3. Mark Jackson, Andrew Lowey. Handbook of extemporaneous preparation, The NHS Pharmaceutical Quality Assurance Committee, pharmaceutical press.

3- Electronic Materials and Web Sites *etc*.

3. https://www.slideshare.net/zulfiquer732/hospital-pharmacy-95835648
4. https://www.slideshare.net/arthamrajashekar/organization-of-hospital-pharmacy-slides

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

Medical statistics

Course Code (**FMS427**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

X. Course Identification and General Information:

183	**Course Title:**	**Medical statistics**			
184	**Course Code &Number:**	**FMS427**			
185	**Credit hours:**	C.H			TOTAL
		L.	P.	T.	
		2	-	-	**2**
186	**Study level/ semester at which this course is offered:**	*(4th) Year – (2nd) semester*			
187	**Pre –requisite (if any):**	-			
188	**Co –requisite (if any):**	-			
189	**Program (s) in which the course is offered:**	**All programs offered by the faculty**			
190	**Language of teaching the course:**	**ENGLISH**			
191	**Location of teaching the course:**	**IN THE UNIVERSITY**			
192	**Prepared by**				
193	**Date of Approval**				

L: lecturing;; P: practical ; T.: training

II. Course Description:

The course provides the student with knowledge and skills of statistics required to which will help the student to use the proper methods to collect the data, employ the correct analyses, and effectively present the results, which is significant while conducting scientific research and analytical experiments

يزود المقرر الطالب بالمعرفة والمهارات الإحصائية المطلوبة والتي ستساعد الطالب على استخدام الأساليب المناسبة لجمع البيانات، وتوظيف التحليلات الصحيحة، وتقديم النتائج بشكل فعال، وهو أمر مهم أثناء إجراء البحث العلمي والتجارب التحليلية

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

48. Alignment CILOs to PILOs

No.	PILOs	CILOs
A12	Describe the methods of biostatistics and pharmaceutical calculations	**a1.** Discuss the basic statistical principles and methods for data analysis.
B1	Collect interpret and assess information and data relevant to pharmacy practice.	**b1.** Interpret the graphical and numerical statistical parameters.
C6	Apply administrative and Pharmacoeconomics rules in pharmacy and ethically use marketing skills for drug promotion.	**c1.** Apply rules of statistics to analyze biomedical/pharmaceutical data
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.**Develop decision making skills using outcomes of statistical analysis.

49. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Discuss the basic statistical principles and methods for data analysis.	**Active lecture.**	**written exams**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies

b1. Interpret the graphical and numerical statistical parameters.	**Active lecture., feed-back learning**	**Written exams, assignments**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Apply rules of statistics to analyze biomedical/pharmaceutical data	**Feed-back learning, Active lecture.**	**quizzes, assignments, written exams**
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Develop decision making skills using outcomes of statistical analysis.	**Feed-back learning**	**Assignments**

XLIII. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, b1, c1	definition and significant of statistics, types of data: data, parametric data, nominal data , categorization of data, presentation of data	1	2
2	**Descriptive statistics**	a1, b1, c1	Mean, mode, median, standard deviation, variance, standard error, coefficient of variation.	4	8
3	**Distribution of data**	a1, b1, c1	Types: normal, abnormal; interpretation, solving problems	1	2
4	**Sampling**	a1, b1, c1	definition of population, samples, methods of sampling, with solving problems	1	2
MID-TERM EXAM				1	2
5	**95 % confidence Interval**	a1, b1, c1	Definition, significance, applications, solving problems	1	2
6	**Correlation statistics**	a1, b1, c1	• Types of correlation • Linear regression • Pearson correlation • Spearman rank correlation • Other methods • solving problems	1	2
7	**Comparative statistics: testing of variations**	a1, b1, c1	• Hypothesis • F-test : P-value , significance of differences in variances between two sets of data, , with solving problems • Student-t test : P-value, significance of differences in means between two sets of data , one-sided test, two-sided test, assuming equal variance, assuming	4	8

			unequal variance, with solving problems • ANOVA : P-value, significance of differences in variances between more than two sets of data , single-factor test, two-factors with replication test, two-factors without replication test • Chi-square test : compare the differences in categorized data. • solving problems		
7	**Introduction to Computer programs in statistics**	a1, b1, c1	• SPSS • Microsoft excel • others	2	4
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

XLVII. Teaching strategies of the course:

lecture - Discussion: a short lecture/ address followed by discussion

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

XLIV. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to solve statistical problems during Tutorial at the class .	b1, c1, d1	7	

VII. Schedule of Assessment Tasks for Students During the Semester

(All assessments done by the teacher)

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
2	Term Works	Quizzes	4-13, 14	10	10	c1
		Assignments	7, 12	10	10	b1, c1, d1
3	Mid-semester exam (written exam)		7	20	20	a1, b1, c1
4	Final exam (written exam)		16	60	60	a1, b1, c1
			TOTAL	100	100 %	

XLVII. Learning Resources:

1- Required Textbook(s) (maximum two).

Philip Rowe. Essential statistics for the pharmaceutical sciences, John Wiley & Sons Ltd.

2- Essential References.

2. Arun BhadraKhanal. Methods in Biostatistics For Medical students and Research workers
3. Singh. Biostatistics and introductory calculus

3- Electronic Materials and Web Sites *etc*.

www.en.wikipedia.org/

XXXVIII. Course Policies:

129.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
130.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
131.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
132.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

Medical statistics

I. Course Identification and General Information:

1.	Course Title:	Medical statistics			
2.	Course Code &Number:	FMS427			
3.	Credit hours:	C.H			TOTAL
		L.	P.	T.	
		2	-	-	**2**
4.	Study level/ semester at which this course is offered:	*(4th) Year – (2nd) semester*			
5.	Pre –requisite (if any):	-			
6.	Co –requisite (if any):	-			
7.	Program (s) in which the course is offered:	All programs offered by the faculty			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	IN THE UNIVERSITY			
10.	Prepared by				
11.	Date of Approval				

L: lecturing ;; P: practical ; T.: training

II. Course Description:

The course provides the student with knowledge and skills of statistics required to which will help the student to use the proper methods to collect the data, employ the correct analyses, and effectively present the results, which is significant while conducting scientific research and analytical experiments

يزود المقرر الطالب بالمعرفة والمهارات الإحصائية المطلوبة والتي ستساعد الطالب على استخدام الأساليب المناسبة لجمع البيانات ، وتوظيف التحليلات الصحيحة ، وتقديم النتائج بشكل فعال ، وهو أمر مهم أثناء إجراء البحث العلمي والتجارب التحليلية

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
A12	Describe the methods of biostatistics and pharmaceutical calculations	**a1.** Discuss the basic statistical principles and methods for data analysis.
B1	Collect interpret and assess information and data relevant to pharmacy practice.	**b1.** Interpret the graphical and numerical statistical parameters.
C6	Apply administrative and Pharmacoeconomics rules in pharmacy and ethically use marketing skills for drug promotion.	**c1.** Apply rules of statistics to analyze biomedical/pharmaceutical data
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.**Develop decision making skills using outcomes of statistical analysis.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Discuss the basic statistical principles and methods for data analysis.	**Active lecture.**	**written exams**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret the graphical and numerical statistical parameters.	**Active lecture., feed-back learning**	**Written exams, assignments**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Apply rules of statistics to analyze biomedical/pharmaceutical data	**Feed-back learning, Active lecture.**	**quizzes, assignments, written exams**
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Develop decision making skills using outcomes of statistical analysis.	**Feed-back learning**	**Assignments**

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, b1, c1	definition and significant of statistics, types of data: data, parametric data, nominal data , categorization of data, presentation of data	1	2
2	**Descriptive statistics**	a1, b1, c1	Mean, mode, median, standard deviation, variance, standard error, coefficient of variation.	4	8
3	**Distribution of data**	a1, b1, c1	Types: normal, abnormal; interpretation, solving problems	1	2
4	**Sampling**	a1, b1, c1	definition of population, samples, methods of sampling, with solving problems	1	2
MID-TERM EXAM				1	2
5	**95 % confidence Interval**	a1, b1, c1	Definition, significance, applications, solving problems	1	2
6	**Correlation statistics**	a1, b1, c1	• Types of correlation • Linear regression • Pearson correlation • Spearman rank correlation • Other methods • solving problems	1	2
7	**Comparative statistics: testing of variations**	a1, b1, c1	• Hypothesis • F-test : P-value , significance of differences in variances between two sets of data, , with solving problems • Student-t test : P-value, significance of differences in means between two sets of data , one-sided test, two-sided test, assuming equal variance, assuming	4	8

			unequal variance, with solving problems • ANOVA : P-value, significance of differences in variances between more than two sets of data , single-factor test, two-factors with replication test, two-factors without replication test • Chi-square test : compare the differences in categorized data. • solving problems		
7	**Introduction to Computer programs in statistics**	a1, b1, c1	• SPSS • Microsoft excel • others	2	4
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

V. Teaching strategies of the course:

Active lecture a short lecture/ address followed by discussion

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

XLV. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to solve statistical problems during Tutorial at the class .	b1, c1, d1	7	

VII. Schedule of Assessment Tasks for Students During the Semester

(All assessments done by the teacher)

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
2	Term Works	Quizzes	4-13, 14	10	10	c1
		Assignments	7, 12	10	10	b1, c1, d1
3	Mid-semester exam (written exam)		7	20	20	a1, b1, c1
4	Final exam (written exam)		16	60	60	a1, b1, c1
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Philip Rowe. Essential statistics for the pharmaceutical sciences, John Wiley & Sons Ltd.

2- Essential References.

1. Arun BhadraKhanal. Methods in Biostatistics For Medical students and Research workers
2. Singh. Biostatistics and introductory calculus

3- Electronic Materials and Web Sites *etc*.

www.en.wikipedia.org/

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

MEDICINAL CHEMISTRY IV

Course Code (**PHR422**)

XXX. Course Identification and General Information:

19	**Course Title:**	**MEDICINAL CHEMSITRY IV**			
19	**Course Code &Number:**	**PHR 422**			
19	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	**3**
19	**Study level/ semester at which this course is offered:**	*(4TH) Year – (second) semester*			
19	**Pre –requisite (if any):**				
19	**Co –requisite (if any):**	**Co : PHR421 (Pharmacology & therapeutics IV)**			
20	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
20	**Language of teaching the course:**	**ENGLISH**			
20	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**			
20	**Prepared by**				
20	**Date of Approval**				

L: lecturing ;; P: practical ; T.: training

XXXI. Course Description:

This course is the fourth one among (Medicinal chemistry) courses which are designed to provide knowledge and skills in chemistry of medicinal agents (drugs). It deals with the physicochemical properties, chemical synthesis, quantitative structure activity relationship (SAR), qualitative structure activity relationship (QSAR), pharmacophore molecules, mechanism of action, and metabolism of drugs used for infections and cancer. Also there are practical part concerns with Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of some drugs used for infections and cancer.

هذه المقرر هو الرابع من بين مقررات (الكيمياء الدوائية) المصممة لتوفير المعرفة والمهارات في كيمياء المركبات

الطبية (الأدوية). يتعلق بالخصائص الفيزيائية والكيميائية ، والتركيب الكيميائي ، وعلاقة النشاط بالتركيب كميا (SAR) ، وعلاقة نشاط بالتركيب نوعيا (QSAR) ، وجزيئات في الدواء المسؤولة عن النشاط ، وآلية العمل ، واستقلاب الأدوية المستخدمة للعدوى والسرطان. هناك أيضًا جزء عملي يتعلق بالخصائص الفيزيائية والكيميائية للأدوية والتعرف الكيميائي أو الكروماتوغرافي أو التحليل الطيفي لبعض الأدوية المستخدمة للعدوى والسرطان.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

7. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.
A4	Describe analytical methods, principles, design and development techniques	**a2.** Explain the principles of synthesis, purification and metabolic reactions of chemotherapeutic drugs used for infections and cancer.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in chemical synthesis of drugs.
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the rules of structure-activity relationship to construct pharmacophore of chemotherapeutic drugs used for infections and cancer.
		b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3.** Classify, chemically, chemotherapeutic drugs used for infections and cancer.
		b4 . Compare between chemically related drugs based on their chemical structure
B3	Design an evaluate different types of	**b5.** Design newer chemotherapeutic drugs used for

	safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	infections and cancer.
Professional and practical skills: upon completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4 Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

8. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.	**Active Lecture-discussion**	**Written exams**
a2. Explain the principles of synthesis, purification and metabolic reactions of chemotherapeutic drugs used for infections and cancer.		
a3. Describe the role of pharmacist in chemical synthesis of drugs.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret the rules of structure-activity relationship to construct pharmacophore of chemotherapeutic drugs used for infections and cancer.	**Active Lecture-discussion , feed-back learning**	**Written exams , quizzes**
b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing	**Active Lecture-discussion**	**Written exams**
b3. Classify, chemically, chemotherapeutic drugs used for infections and cancer.		
b4 . Compare between chemically related drugs based on their chemical structure		
b5. Design newer	**Group-project**	**Assignments**

chemotherapeutic drugs used for infections and cancer.		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**Group-project**	**Assignments**
c4 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Lab. term works, assignment**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**laboratory practice**	**Lab. term works, final practical exam**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of					
1	**Chemotherapeutic drugs For infections**	a1, a2, a3, b1, b2, b3, b4	**Antibacterials** **β-lactam and related antibiotics** : Penicillins, , Cephalosporins, Carbapenems, monobactams, …etc. **Protein synthesis inhibitors ;** macrolides, lincosamides, aminoglycosides, tetracyclines **Nucleic acid synthesis inhibitors** Quinolones, sulfonamides, trimethoprim **Other antibiotics**	5	10
			Anti-tubercular & anti-leprotic drugs	1	2
			Antiprotozoals Anti-malarial drugs Antamoebics, antigiardials and antitrichomonals antitrypanosomals, others	5	10
			Anthelmintic drugs Drugs that used in treatment of worms infestation		
			Antifungal drugs Drugs used in treatment of fungal infections		
			Antiviral drugs Drugs used in treatment of viral infections		
2	**Drugs for cancer**	a1, a2, a3, b1, b2, b3, b4	• Antimetabolites : methotrexate, 5-flurouracil. 6-mercaptopurine • Alkylating agents: nitrogen mustards, alkyl sulphonates, nitrosurea • Natural products: antibiotics, plant alkaloids, enzymes, interferons • Hormones and hormones anatgonists • Radioactive isotopes Miscellaneous: cisplatin, mitotane , etc	4	8
FINAL - EXAM				1	2
TOTAL				16	32

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	AlignedCourse Intended Learning Outcomes CILOs
229.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: **amoxicillin**	**1**	**2**	c1, c2, d1, d2, d3
230.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: **cefixime**	**1**	**2**	c1, c2, d1, d2, d3
231.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: of: **tetracycline**	**1**	**2**	c1, c2, d1, d2, d3
232.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: **ciprofloxacin**	**1**	**2**	c1, c2, d1, d2, d3
233.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: **miconazole**	**1**	**2**	c1, c2, d1, d2, d3
234.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: **zidovudine**	**1**	**2**	c1, c2, d1, d2, d3
235.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: **metronidazole**	**1**	**2**	c1, c2, d1, d2, d3
236.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of:: **chloroquine**	**1**	**2**	c1, c2, d1, d2, d3
237.	Synthesis of drugs	**1**	**2**	c1, c2, d1, d2, d3
238.	Purification of drugs.	**2**	**2**	c1, c2, d1, d2, d3

PRACTICAL EXAM	**1**	**2**	
Total	**12**	**24**	
Number of Weeks		**12**	

XLVIII. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XIV. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Group** : each group of students will be assigned to hypothetically design newer drugs form a studied patent drug using SAR principles	b5, c3, c4, d1, d3	8	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1
		Assignments	7, 12	5	5	b5, c3, c4, d1, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2,a3 , b1, b2, b3, b4
3	Final exam (written exam)		16	50	50	a1, a2,a3 , b1, b2, b3, b4
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3
		Accomplishments		5	5	
2	Final exam (practical)		12	20	20	c1, c2, d2
			Total	30	30 %	

XLVIII. Learning Resources:

1- Required Textbook(s) (maximum two).

24. Gareth Thomas, Medicinal chemistry: an introduction , John Wiley & Sons Ltd,
25. Siddique. A textbook of medicinal chemistry
26. Wilson and Gisvold's textbook of organic medicinal and pharmaceutical chemistry, Copyright © 2011 by Lippincott Williams & Wilkins, a Wolters Kluwer business.

2- Essential References.

1. AshutochKar. Medicinal chemistry, New age international publisher
2. Rajie. Pharmaceutical chemistry
3. Wermuth. The practice of medicinal chemistry

3- Electronic Materials and Web Sites *etc*.

1- https://pubs.acs.org/journal/jmcmar
2- https://benthamscience.com/journals/medicinal-chemistry/

XXXIX. Course Policies:

133.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
134.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
135.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
136.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
137.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
138.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

MEDICINAL CHEMISTRY IV

I. Course Identification and General Information:

1.	Course Title:	MEDICINAL CHEMSITRY IV			
2.	Course Code &Number:	PHR 422			
3.	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	**3**
4.	Study level/ semester at which this course is offered:	*(4TH) Year – (second) semester*			
5.	Pre –requisite (if any):				
6.	Co –requisite (if any):	Co : PHR421 (Pharmacology & therapeutics IV)			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FACILITY			
10	Prepared by				
11	Date of Approval				

L: lecturing ;; P: practical ; T.: training

II. Course Description:

This course is the fourth one among (Medicinal chemistry) courses which are designed to provide knowledge and skills in chemistry of medicinal agents (drugs). It deals with the physicochemical properties, chemical synthesis, quantitative structure activity relationship (SAR), qualitative structure activity relationship (QSAR), pharmacophore molecules, mechanism of action, and metabolism of drugs used for infections and cancer. Also there are practical part concerns with Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of some drugs used for infections and cancer.

هذه المقرر هو الرابع من بين مقررات (الكيمياء الدوائية) المصممة لتوفير المعرفة والمهارات في كيمياء المركبات الطبية (الأدوية). يتعلق بالخصائص الفيزيائية والكيميائية ، والتركيب الكيميائي ، وعلاقة النشاط بالتركيب كميا (SAR) ، وعلاقة نشاط بالتركيب نوعيا (QSAR) ، وجزيئات في الدواء المسؤولة عن النشاط ، وآلية العمل ، واستقلاب الأدوية المستخدمة للعدوى والسرطان. هناك أيضًا جزء عملي يتعلق بالخصائص الفيزيائية والكيميائية

للأدوية والتعرف الكيميائي أو الكروماتوغرافي أو التحليل الطيفي لبعض الأدوية المستخدمة للعدوى والسرطان.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.
A4	Describe analytical methods, principles, design and development techniques	**a2.** Explain the principles of synthesis, purification and metabolic reactions of chemotherapeutic drugs used for infections and cancer.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in chemical synthesis of drugs.
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the rules of structure-activity relationship to construct pharmacophore of chemotherapeutic drugs used for infections and cancer.
		b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3.** Classify, chemically, chemotherapeutic drugs used for infections and cancer.
		b4 . Compare between chemically related drugs based on their chemical structure
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b5.** Design newer chemotherapeutic drugs used for infections and cancer.

Professional and practical skills: upon completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c3 .**Search efficiently for information using documented and electronic sources of information.
		c4 Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.	**Active Lecture-discussion**	**Written exams**
a2. Explain the principles of synthesis, purification and metabolic reactions of chemotherapeutic drugs used for infections and cancer.		
a3. Describe the role of pharmacist in chemical synthesis of drugs.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret the rules of structure-activity relationship to construct pharmacophore of chemotherapeutic drugs used for infections and cancer.	**Active Lecture-discussion , feed-back learning**	**Written exams , quizzes**
b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing	**Active Lecture-discussion**	**Written exams**
b3. Classify, chemically, chemotherapeutic drugs used for infections and cancer.		
b4 . Compare between chemically related drugs based on their chemical structure		
b5. Design newer	**Group-project**	**Assignments**

chemotherapeutic drugs used for infections and cancer.		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3 . Search efficiently for information using documented and electronic sources of information.	**Group-project**	**Assignments**
c4 Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group-project**	**Lab. term works, assignment**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**laboratory practice**	**Lab. term works, final practical exam**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
Physicochemical properties, synthesis, chemical & common names, structure-activity relationship, metabolism of					
1	**Chemotherapeutic drugs For infections**	a1, a2, a3, b1, b2, b3, b4	**Antibacterials** **β-lactam and related antibiotics** : Penicillins, , Cephalosporins, Carbapenems, monobactams, …etc. **Protein synthesis inhibitors ;** macrolides, lincosamides, aminoglycosides, tetracyclines **Nucleic acid synthesis inhibitors** Quinolones, sulfonamides, trimethoprim **Other antibiotics**	5	10
			Anti-tubercular & anti-leprotic drugs	1	2
			Antiprotozoals Anti-malarial drugs Antamoebics, antigiardials and antitrichomonals antitrypanosomals, others	5	10
			Anthelmintic drugs Drugs that used in treatment of worms infestation		
			Antifungal drugs Drugs used in treatment of fungal infections		
			Antiviral drugs Drugs used in treatment of viral infections		
2	**Drugs for cancer**	a1, a2, a3, b1, b2, b3, b4	• Antimetabolites : methotrexate, 5-flurouracil. 6-mercaptopurine • Alkylating agents: nitrogen mustards, alkyl sulphonates, nitrosurea • Natural products: antibiotics, plant alkaloids, enzymes, interferons • Hormones and hormones anatgonists • Radioactive isotopes Miscellaneous: cisplatin, mitotane , etc	4	8
FINAL - EXAM				1	2
TOTAL				16	32

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Intended Learning Outcomes CILOs
1.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: **amoxicillin**	**1**	**2**	c1, c2, d1, d2, d3
2.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: **cefixime**	**1**	**2**	c1, c2, d1, d2, d3
3.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: of: **tetracycline**	**1**	**2**	c1, c2, d1, d2, d3
4.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: **ciprofloxacin**	**1**	**2**	c1, c2, d1, d2, d3
5.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: **miconazole**	**1**	**2**	c1, c2, d1, d2, d3
6.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: **zidovudine**	**1**	**2**	c1, c2, d1, d2, d3
7.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: **metronidazole**	**1**	**2**	c1, c2, d1, d2, d3
8.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of:: **chloroquine**	**1**	**2**	c1, c2, d1, d2, d3
9.	Synthesis of drugs	**1**	**2**	c1, c2, d1, d2, d3
10.	Purification of drugs.	**2**	**2**	c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	

Total	**12**	**24**	
Number of Weeks		**12**	

XLIX. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Group** : each group of students will be assigned to hypothetically design newer drugs form a studied patent drug using SAR principles	b5, c3, c4, d1, d3	8	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1
		Assignments	7, 12	5	5	b5, c3, c4, d1, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2,a3 , b1, b2, b3, b4
3	Final exam (written exam)		16	50	50	a1, a2,a3 , b1, b2, b3, b4
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, d1, d2, d3
		Accomplishments		5	5	
2	Final exam (practical)		12	20	20	c1, c2, d2
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Gareth Thomas, Medicinal chemistry: an introduction , John Wiley & Sons Ltd,
2. Siddique. A textbook of medicinal chemistry
3. Wilson and Gisvold's textbook of organic medicinal and pharmaceutical chemistry, Copyright © 2011 by Lippincott Williams & Wilkins, a Wolters Kluwer business.

2- Essential References.

1. AshutochKar. Medicinal chemistry, New age international publisher
2. Rajie. Pharmaceutical chemistry
3. Wermuth. The practice of medicinal chemistry

3- Electronic Materials and Web Sites *etc*.

1- https://pubs.acs.org/journal/jmcmar
2- https://benthamscience.com/journals/medicinal-chemistry/

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PHARMACOLOGY & THERAPEUTICS IV

Course Code (**PHR421**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XXXII. Course Identification and General Information:

20	**Course Title:**	**PHARMACOLOGY& THERAPEUTICS IV**			
20	**Course Code &Number:**	**PHR421**			
20	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	**3**
20	**Study level/ semester at which this course is offered:**	*(4TH) Year – (second) semester*			
20	**Pre –requisite (if any):**	----			
21	**Co –requisite (if any):**	**Co : PHR422 (Medicinal Chemistry IV)**			
21	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
21	**Language of teaching the course:**	**ENGLISH**			
21	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**			
21					
21	**Date of Approval**				

L: lecturing ; P: practical ; T.: training

XXXIII. Course Description:

This course also as the previous courses (pharmacology & therapeutics I II, III) deals with the study of pharmacodynamics (mechanism of action, therapeutic effect, adverse effects) and pharmacokinetics (absorption, distribution, metabolism, execration) of drugs that used and affecting infections and cancer. The practical part provides the skills to handle experimental animals and test actions of certain drugs on them

يتناول هذا المقرر الدراسي أيضًا كالمقررات السابقة (علم الأدوية والعلاجيات الأول والثاني والثالث) دراسة الديناميكيات الدوائية (آلية العمل ، والأثر العلاجي ، والآثار الضارة) والحركية الدوائية (الامتصاص ، والتوزيع ، والتمثيل الغذائي ، والإخراج) للأدوية المستخدمة لعلاج العدوى والسرطان. يوفر الجزء العملي للطالب مهارة التعامل مع حيوانات التجارب و اختبار بعض الأدوية عليها

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

3. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A5	Identify actions of medicines on human body.	**a1.** Identify the actions of medicines in human body, their therapeutic uses, adverse effects drug interactions and interactions
A8	Describe Biopharmaceutics and pharmacokinetics of medicines	**a2.** Describe the pharmacokinetics of drugs.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in providing correct information on rational use of medications.
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1 .**Classify drugs used for infections and cancer.
		b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency)and drug limitations.
Professional and practical skills: upon completion of the course, students will be able to:		
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c1.** Carry out pharmacological experiments.
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c2 .** Advise the patient and healthcare professional to optimize medicine use
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate efficiently and behave in disciplines with colleagues
D2	Develop and demonstrate skills of time managements, self-learning and	**d2.** Demonstrate time management and decision making skills.

	decision making.	
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate effectively in a team work

4. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the actions of medicines in human body, their therapeutic uses, adverse effects drug interactions and interactions	**Active Lecture**	**Written exams**
a2. Describe the pharmacokinetics of drugs.		
a3. Describe the role of pharmacist in providing correct information on rational use of medications.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 . Classify drugs used for infections and cancer.	**Active Lecture**	**Written exams**
b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency)and drug limitations.	**Active Lecture, feed-back learning**	**Written exam , quizzes, assignments**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Carry out pharmacological experiments.	**Lab. Practice**	**Lab. term works, final practical exam**
c2 . Advise the patient and healthcare professional to optimize medicine use	**feed-back learning**	**assignment**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching

Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate efficiently and behave in disciplines with colleagues	**Lab. Practice**	**Lab. term works, final practical exam**
d3. Participate effectively in a team work		
d2. Demonstrate time management and decision making skills.	**Feed-back learning**	**Assignments**

LV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
2	**Chemotherapeutic drugs for bacterial infections** (Antibacterials)	a1, a2, a3, b1	**Pharmacokinetics, Pharmacodynamics [drug benefits : MOA, therapeutic action, indications, efficacy and potency) and drug limitation (side effects, precautions, contraindications) and comparison of :** **Antibacterials** • antibiotics : (β-lactams: penicillins, cephalosporins, penems, others), macrolides, aminoglycosides, tetracyclines, chloramphenicols, lincosamides, others • Synthetic Antibacterials : sulphonamides, fluroquinolones, nitrothiazoles (e.g. metronidazole) • Antituberculars and antileprotics • Antiseptics and disinfectants	4	8
mid-term exam				1	2
3	**Chemotherapeutic drugs for fungi and viruses infections** (Antifungals& antivirals)	a1, a2, a3, b1	**Pharmacokinetics, Pharmacodynamics [drug benefits : MOA, therapeutic action, indications, efficacy and potency) and drug limitation (side effects, precautions, contraindications) and comparison of :** **Antifungals (antimycotics)** • Polyene antibiotics : nystatin, amphotericin B, griseofulvin	4	8

			• antimetabolites : flucytosine azoles : clotrimazole, miconazoles, etc **Antivirals** • anti-herpes simplex • anti-influenza • anti-AIDS • immunomodulators e.g. interferone		
4	**Chemotherapeutic drugs for parasitic infections**	a1, a2, a3, b1	**Pharmacokinetics, Pharmacodynamics [drug benefits : MOA, therapeutic action, indications, efficacy and potency) and drug limitation (side effects, precautions, contraindications) and comparison of :** **Antiprotozoals** • Antamoebics and antigiardials • Anti-leishmanials and anti-toxoplasmosis • Antimalarials **Anthelmintics** • For common worms infection • For tape worm : trematodes (taenia, H. nana) infections • For schistosoma (Bilharzia)infections • For filarisis	2	4
5	**Chemotherapeutic drugs for cancer (Anticancers ; antineoplastic)**	a1, a2, a3, b1	**Pharmacokinetics, Pharmacodynamics [drug benefits : MOA, therapeutic action, indications, efficacy and potency) and drug limitation (side effects, precautions, contraindications) and comparison of :** • Antimetabolites : methotrexate, 5-flurouracil. 6-mercaptopurine • Alkylating agents: nitrogen mustards, alkyl sulphonates, nitrosurea • Natural products: antibiotics, plant alkaloids, enzymes, interferons • Hormones and hormones anatgonists • Radioactive isotopes • Miscellaneous: cisplatin, mitotane , etc	4	8
FINAL – EXAM				1	2
TOTAL				16	32

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
239.	Introduction to pharmacology Lab.: safety requirements, list of experiments, handling animals, how to report, etc.	**1**	**2**	c1, d1, d2, d3
240.	Testing of drug effects on rabbit eyes: miotics, mydriatics, normal saline	**2**	**4**	c1, d1, d2, d3
241.	Testing of skin irritation of dermatological products on on animals: (ciprofloxacin cream), tetracycline ointments, ketoprofen gel	**2**	**4**	c1, d1, d2, d3
242.	Testing of eye irritancy of solutions : eye washes	**1**	**2**	c1, d1, d2, d3
243.	testing of LD_{50} of drugs : warfarin, digoxin	**2**	**4**	c1, d1, d2, d3
244.	Pyrogen testing of parenteral injections: vitamin B complex ampoules, sterile water for injection	**2**	**4**	c1, d1, d2, d3
245.	Review	**1**	**2**	c1, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	
Total		**12**	**24**	

VI. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

VII. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to solve a list of problems related to advising healthcare of medicines use based comparison of drug benefits and risks for specific patients e.g. CVS patients, renal failure patients, etc.	b2, c2, d2	6-12	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b2
		Assignments	7, 12	5	5	b2, c2, d2
2	Mid-semester exam (written exam)		7	10	10	a1, a2, a3, b1
3	Final exam (written exam)		16	50	50	a1, a2, a3, b1
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, d1, d2, d3
		Accomplishments		5	5	
2	Final exam (practical)		12	20	20	c1, d1, d2, d3
			Total	30	30 %	

IX. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Katzung –Basic and Clinical Pharmacology, McGraw-Hill
2. Rang, Dale and Ritter. Pharmacology, Churchill Livingstone.

2- Essential References.

1. Richard A. Harvey. Lippincott's pharmacology, Lippincott William and Wilkins.
2. Udaykumar. Text book of medical pharmacology

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/drdhriti/anticancer-drugs-drdhriti
2. https://www.slideshare.net/diptisorte/drugs-used-in-nervous-system

XI.Course Policies:

7.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
8.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
9.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
10.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
11.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
12.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

PHARMACOLGY & THERAPEUTICS IV

I. Course Identification and General Information:

1.	Course Title:	PHARMACOLOGY& THERAPEUTICS IV			
2.	Course Code &Number:	PHR421			
3.	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	3
4.	Study level/ semester at which this course is offered:	*(4TH) Year – (second) semester*			
5.	Pre –requisite (if any):	----			
6.	Co –requisite (if any):	Co : PHR422 (Medicinal Chemistry IV)			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FACILITY			
10					
11	Date of Approval				

L: lecturing ; P: practical ; T.: training

II. Course Description:

This course also as the previous courses (pharmacology & therapeutics I II, III) deals with the study of pharmacodynamics (mechanism of action, therapeutic effect, adverse effects) and pharmacokinetics (absorption, distribution, metabolism, execration) of drugs that used and affecting infections and cancer. The practical part provides the skills to handle experimental animals and test actions of certain drugs on them

يتناول هذا المقرر الدراسي أيضًا كالمقررات السابقة (علم الأدوية والعلاجيات الأول والثاني والثالث) دراسة الديناميكيات الدوائية (آلية العمل ، والأثر العلاجي ، والآثار الضارة) والحركية الدوائية (الامتصاص ، والتوزيع ، والتمثيل الغذائي ، والإخراج) للأدوية المستخدمة لعلاج العدوى والسرطان. يوفر الجزء العملي للطالب مهارة التعامل مع حيوانات التجارب و اختبار بعض الأدوية عليها

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A5	Identify actions of medicines on human body.	**a1.** Identify the actions of medicines in human body, their therapeutic uses, adverse effects drug interactions and interactions
A8	Describe Biopharmaceutics and pharmacokinetics of medicines	**a2.** Describe the pharmacokinetics of drugs.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in providing correct information on rational use of medications.
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1 .**Classify drugs used for infections and cancer.
		b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency)and drug limitations.
Professional and practical skills: upon completion of the course, students will be able to:		
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c1.** Carry out pharmacological experiments.
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c2 .** Advise the patient and healthcare professional to optimize medicine use
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate efficiently and behave in disciplines with colleagues
D2	Develop and demonstrate skills of time managements, self-learning and	**d2.** Demonstrate time management and decision making skills.

	decision making.	
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate effectively in a team work

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the actions of medicines in human body, their therapeutic uses, adverse effects drug interactions and interactions	**Active Lecture**	**Written exams**
a2. Describe the pharmacokinetics of drugs.		
a3. Describe the role of pharmacist in providing correct information on rational use of medications.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 . Classify drugs used for infections and cancer.	**Active Lecture**	**Written exams**
b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency)and drug limitations.	**Active Lecture, feed-back learning**	**Written exam , quizzes, assignments**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Carry out pharmacological experiments.	**Lab. Practice**	**Lab. term works, final practical exam**
c2 . Advise the patient and healthcare professional to optimize medicine use	**feed-back learning**	**assignment**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching

Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate efficiently and behave in disciplines with colleagues	**Lab. Practice**	**Lab. term works, final practical exam**
d3. Participate effectively in a team work		
d2. Demonstrate time management and decision making skills.	**Feed-back learning**	**Assignments**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
2	**Chemotherapeutic drugs for bacterial infections** (Antibacterials)	a1, a2, a3, b1	**Pharmacokinetics, Pharmacodynamics [drug benefits : MOA, therapeutic action, indications, efficacy and potency) and drug limitation (side effects, precautions, contraindications) and comparison of :** **Antibacterials** • antibiotics : (β-lactams: penicillins, cephalosporins, penems, others), macrolides, aminoglycosides, tetracyclines, chloramphenicols, lincosamides, others • Synthetic Antibacterials : sulphonamides, fluroquinolones, nitrothiazoles (e.g. metronidazole) • Antituberculars and antileprotics • Antiseptics and disinfectants	4	8
mid-term exam				1	2
3	**Chemotherapeutic drugs for fungi and viruses infections** (Antifungals& antivirals)	a1, a2, a3, b1	**Pharmacokinetics, Pharmacodynamics [drug benefits : MOA, therapeutic action, indications, efficacy and potency) and drug limitation (side effects, precautions, contraindications) and comparison of :** **Antifungals (antimycotics)** • Polyene antibiotics : nystatin, amphotericin B, griseofulvin	4	8

			• antimetabolites : flucytosine azoles : clotrimazole, miconazoles, etc **Antivirals** • anti-herpes simplex • anti-influenza • anti-AIDS • immunomodulators e.g. interferone		
4	**Chemotherapeutic drugs for parasitic infections**	a1, a2, a3, b1	**Pharmacokinetics, Pharmacodynamics [drug benefits : MOA, therapeutic action, indications, efficacy and potency) and drug limitation (side effects, precautions, contraindications) and comparison of :** **Antiprotozoals** • Antamoebics and antigiardials • Anti-leishmanials and anti-toxoplasmosis • Antimalarials **Anthelmintics** • For common worms infection • For tape worm : trematodes (taenia, H. nana) infections • For schistosoma (Bilharzia)infections • For filarisis	2	4
5	**Chemotherapeutic drugs for cancer (Anticancers ; antineoplastic)**	a1, a2, a3, b1	**Pharmacokinetics, Pharmacodynamics [drug benefits : MOA, therapeutic action, indications, efficacy and potency) and drug limitation (side effects, precautions, contraindications) and comparison of :** • Antimetabolites : methotrexate, 5-flurouracil. 6-mercaptopurine • Alkylating agents: nitrogen mustards, alkyl sulphonates, nitrosurea • Natural products: antibiotics, plant alkaloids, enzymes, interferons • Hormones and hormones anatgonists • Radioactive isotopes • Miscellaneous: cisplatin, mitotane , etc	4	8
FINAL – EXAM				1	2
TOTAL				16	32

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	Introduction to pharmacology Lab.: safety requirements, list of experiments, handling animals, how to report, etc.	**1**	**2**	c1, d1, d2, d3
2.	Testing of drug effects on rabbit eyes: miotics, mydriatics, normal saline	**2**	**4**	c1, d1, d2, d3
3.	Testing of skin irritation of dermatological products on on animals: (ciprofloxacin cream), tetracycline ointments, ketoprofen gel	**2**	**4**	c1, d1, d2, d3
4.	Testing of eye irritancy of solutions : eye washes	**1**	**2**	c1, d1, d2, d3
5.	testing of LD_{50} of drugs : warfarin, digoxin	**2**	**4**	c1, d1, d2, d3
6.	Pyrogen testing of parenteral injections: vitamin B complex ampoules, sterile water for injection	**2**	**4**	c1, d1, d2, d3
7.	Review	**1**	**2**	c1, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	
Total		**12**	**24**	

VII. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to solve a list of problems related to advising healthcare of medicines use based comparison of drug benefits and risks for specific patients e.g. CVS patients, renal failure patients, etc.	b2, c2, d2	6-12	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b2
		Assignments	7, 12	5	5	b2, c2, d2
2	Mid-semester exam (written exam)		7	10	10	a1, a2, a3, b1
3	Final exam (written exam)		16	50	50	a1, a2, a3, b1
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, d1, d2, d3
		Accomplishments		5	5	
2	Final exam (practical)		12	20	20	c1, d1, d2, d3
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Katzung –Basic and Clinical Pharmacology, McGraw-Hill
2. Rang, Dale and Ritter. Pharmacology, Churchill Livingstone.

2- Essential References.

1. Richard A. Harvey. Lippincott's pharmacology, Lippincott William and Wilkins.
2. Udaykumar. Text book of medical pharmacology

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/drdhriti/anticancer-drugs-drdhriti
2. https://www.slideshare.net/diptisorte/drugs-used-in-nervous-system

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PHYTOCHEMISTRY II

Course Code (**PHR424**)

XXXIV. Course Identification and General Information:

21	**Course Title:**	**PHYTOCHEMISTRY II**			
21	**Course Code &Number:**	**PHR424**			
21	**Credit hours:**	C.H			TOTAL
		L.	P.	T.	
		2	1	-	**3**
21	**Study level/ semester at which this course is offered:**	*(Fourth) Year – (2nd) semester*			
22	**Pre –requisite (if any):**	**PHR414 (Phytochemistry I)**			
22	**Co –requisite (if any):**	**None**			
22	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
22	**Language of teaching the course:**	**ENGLISH**			
22	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**			
22	**Prepared by**				
22	**Date of Approval**				

L: lecturing ;; P: practical ; T.: training

XXXV. Course Description:

This course is complementary to (phytochemistry I) course and both courses together with Pharmacognosy courses comprise the basis of phytotherapy as a part of complementary and alternative medicines . This course provides the students with study and knowledge of chemical structures extraction , isolation and identifications of phytochemicals present in medicinal plants including : phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g. bitter principles .

يعتبر هذا المقررمكمل لمقرر (كيمياء العقاقير 1) ويشكل كلا المقررين مع مقررات علم العقاقير1و 2 أسس التداوي بالأعشاب كجزء من الطب المكمل و البديل . يزود هذا المقرر الطلاب بالمعرفة بالتركيب الكيميائي للمركبات النباتية وطريقة إستخراجها وعزلها والتعرف على المواد الكيميائية النباتية الموجودة في النباتات الطبية بما في ذلك : مشتقات فينيل بروبان والزيوت المتطايرة والجليكوزيدات والعفص وغيرها .

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

50. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Explain the physicochemical properties of phenyl propane derivatives, volatile oils, glycosides , tannins and present in medicinal plant.
A4	Describe analytical methods, principles, design and development techniques	**a2**. Discuss the methods and techniques used to extract and isolate phenyl propane derivatives, volatile oils, glycosides tannins and bitter constituents present from medicinal plant.
A6	Explain the basis of complementary and alternative medicines	**a3.** Define the botanical sources and therapeutic uses of phenyl propane derivatives, volatile oils, glycosides , tannins present in medicinal plant.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the role of pharmacist in extraction, isolation and identification of phytochemicals.
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Express the chemical structure of phytochemicals using drawings.
		b2. Differentiate between various types of phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g. bitter principles .
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3 .** Classify phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g. bitter principles
		b4. Compare between different types of phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g. bitter

		principles .
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b5.** Select standard operation procedure to extract, isolate and identify phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g. bitter principles from a plant sample
Professional and practical skills: upon completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
		c2. Operate the instruments and perform experiments successfully in the laboratory
C3	Screen for drugs from different sources and carry out pharmacy relevant experiments successfully.	**c3.** Screen for alkalaoid and terpenoid drugs from plant sources.
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c4 .** Search efficiently for information using documented and electronic sources of information.
		c5. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

51. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) ofknowledge& understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the physicochemical properties of phenyl propane derivatives, volatile oils, glycosides , tannins and present in medicinal plant.	**Active Lecture**	**Written exam s**
a2. Discuss the methods and techniques used to extract and isolate phenyl propane derivatives, volatile oils, glycosides tannins and bitter constituents present from medicinal plant.		
a3. Define the botanical sources and therapeutic uses of phenyl propane derivatives, volatile oils, glycosides , tannins present in medicinal plant.		
a4. Describe the role of pharmacist in extraction, isolation and identification of phytochemicals.		

(b) Alignment Course Intended Learning Outcomes (CILOs) ofIntellectual Skillsto Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Express the chemical structure of phytochemicals using drawings.	**Active Lecture, Feed-back learning**	**Written exams, quizzes**
b3 . Classify phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g. bitter principles .	**Active Lecture**	**Written exam s**

b2. Differentiate between various types of phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g. bitter principles	**Active Lecture, lab. practice**	**Written exam s, lab. term works, final practical exam**
b4. Compare between different types of phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g. bitter principles .		
b5. Select standard operation procedure to extract, isolate and identify phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g. bitter principles from a plant sample		

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3. Screen for alkalaoid and terpenoid drugs from plant sources.		
c4 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments,**
c5. Present and report his/her works correctly using appropriate writing rules and technologies		

media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skillsto Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group project**	**lab. term works, final practical exam, assignments**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Feed-back learning, lab. practice**	**Assignments, lab. term works, final practical exam,**

XLVI. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Phenyl propane derivatives**	a1, a2, a3, a4, b1, b2, b3, b4, b5	Introduction(definition, classification, biogenesis) **Hydroxycinnamic acids (** Definition, classification, biosynthesis, chemical structure, physic-chemical properties, extraction , pharmacological properties and uses **Cinnamic aldhydes and monlignols (** Definition, classification, biosynthesis, chemical structure, physic-chemical properties, extraction , pharmacological properties and uses **Coumarins (** Definition, classification, biosynthesis, chemical structure, physic-chemical properties, extraction , pharmacological properties and uses **Stilbenoids (** Definition, classification, biosynthesis, chemical structure, physic-chemical properties, extraction , pharmacological properties and uses	3	6
2	**Volatile oils**	a1, a2, a3, a4, b1, b2, b3, b4, b5	Definition, classification, distribution and occurrence; Extraction : distillation methods and solvent extraction ; Chemical , physical and pharmacological properties examples of crude drugs containing volatile oils	3	6
Midterm exam				1	2
3	**Glycosides**	a1, a2, a3, a4, b1, b2, b3, b4, b5	Introduction (definition, classification, distribution, extraction, isolation and pharmacological properties) **Cardioactive glycosides (**cardinolides, bufadienolides, sugars, structure activity relationship, distribution, extraction,	3	6

			chemical and physical properties, hydrolysis of cardiac glycosides, biogenesis, pharmacological properties , mechanism of action, chemical tests. Chief drugs containing cardiac glycosides (Digitalis, strophanthus, Adonis, Convalaria and squill). **Saponin glycosides** (definition, classification, distribution, structures,biogenesis,chemical , physical properties , characterization, biological and pharmacological properties. Drugs as expectorant ,antitusive, antiexudative, adaptogens and diuretic) **Anthracen glycosides** (classification, distribution, structures, biosynthesis, extraction , chemical, physical properties, characterization, pharmacological properties, Senna, Rhabarub and Aloe) **Flavonoid glycosides**(classification, biosynthesis, chemical structure, physic-chemical properties, rutin, hesperidin and flavonoid containing drugs) **Cynogentic glycosides** (cynogenesis, distribution, structures, biogenesis, detection, extraction, pharmacological activities and cynogenetic drugs) **Glucosinolates(Thioglycosides):** definition, distribution, structures, biogenesis , hydrolysis, toxicity and drugs containing glucosinolates.		6
4	**Tannins**	a1, a2, a3, a4, b1, b2, b3, b4, b5	definition, classification, structure, distribution, biosynthesis, physic-chemical properties, extraction, biological properties , examples of crude drugs containing tannins	1	2
5	**Steroids**	a1, a2, a3, a4, b1, b2, b3, b4, b5	Definition, classification, structures , biogenesis, chemical and physical properties and characterization.	1	2

6	**Miscellaneous e.g. bitter principles**	a1, a2, a3, a4, b1, b2, b3, b4, b5	Definition, classification, structures , biogenesis, chemical and physical properties and characterization.	1	2
Course Review		a1, a2, a3, a4, b1, b2, b3, b4, b5	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	6 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
physicochemical properties , extraction (maceration or percolation or soxhlet extraction) , concentration (if necessary " rotary evaporation', isolation (Thin layer chromatography) and identification of the phytochemicals from crude drugs or parts of medicinal plants				
246.	Phenyl propane derivatives : (cinnamic aldehyde)	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
247.	Volatile oils (peppermint oil)	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
248.	Volatile oils (clove oil)	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
249.	Saponins (Glycyrrhizin)	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
250.	Flavonoids (Hesperetin**)**	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
251.	Flavonoids (apigenin **)**	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
252.	Anthracin Glycoside (sennosides)	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
253.	Cardiac Glycoside (digoxin)	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
254.	Tannins in Tea	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
255.	Miscellaneous: bitter principles (Khellin)	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
256.	Review	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
Total		**12**	**24**	

L. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XV. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: each student will be assigned solve the problems provided by the teacher. The problems involve nomenclature, isolation , chemical reaction, etc.	c4, c5, d2	4-13	3
2	**Group** : each group of students will be assigned to present 2-3 videos or simulations of one of the studied extraction , isolation techniques.	c4, c5, d1, d2, d3	14	2

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1
		Assignments	7, 12	5	5	c4, c5, d1, d2, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2, a3, a4, b1, b2, b3, b4, b5
3	Final exam (written exam)		16	50	50	a1, a2, a3, a4, b1, b2, b3, b4, b5
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b2, b4, b5, c1, c2, c3, d1, d2, d3
		Accomplishments		5	5	
2	Final exam (practical)		12	20	20	b2, b4, b5, c1, c2, c3, d1, d2, d3
Total				30	30 %	

XLIX. Learning Resources:

1- Required Textbook(s) (maximum two).

27. W.C. Evans, Trease and Evans pharmacognosy, W.B.Saunders
28. Amritpal Singh Saroya, Herbalism, Phytochemistry and Ethnopharmacology, CRC press Jarald.

2- Essential References.

29. Bhandari. Textbook of pharmacognosy

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/SonamkzBhutia/pharmacognosy-and-phytochemistry-ii-theory

XL. Course Policies:

139.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
140.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
141.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
142.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
143.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
144.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

Phytochemistry II

I. Course Identification and General Information:

1.	Course Title:	PHYTOCHEMISTRY II			
2.	Course Code &Number:	PHR424			
3.	Credit hours:	C.H			TOTAL
		L.	P.	T.	
		2	1	-	3
4.	Study level/ semester at which this course is offered:	*(Fourth) Year – (2nd) semester*			
5.	Pre –requisite (if any):	PHR414 (Phytochemistry I)			
6.	Co –requisite (if any):	None			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FACILITY			
10	Prepared by				
11	Date of Approval				

L: lecturing ;; P: practical ; T.: training

II. Course Description:

This course is complementary to (phytochemistry I) course and both courses together with Pharmacognosy courses comprise the basis of phytotherapy as a part of complementary and alternative medicines . This course provides the students with study and knowledge of chemical structures extraction , isolation and identifications of phytochemicals present in medicinal plants including : phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g. bitter principles .

يعتبر هذا المقرر مكمل لمقرر (كيمياء العقاقير 1) ويشكل كلا المقررين مع مقررات علم العقاقير1و 2 أسس التداوي بالأعشاب كجزء من الطب المكمل و البديل . يزود هذا المقرر الطلاب بالمعرفة بالتركيب الكيميائي للمركبات النباتية وطريقة استخراجها وعزلها والتعرف على المواد الكيميائية النباتية الموجودة في النباتات الطبية بما في ذلك : مشتقات فينيل بروبان والزيوت المتطايرة والجليكوزيدات والعفص وغيرها

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Explain the physicochemical properties of phenyl propane derivatives, volatile oils, glycosides , tannins and present in medicinal plant.
A4	Describe analytical methods, principles, design and development techniques	**a2**. Discuss the methods and techniques used to extract and isolate phenyl propane derivatives, volatile oils, glycosides tannins and bitter constituents present from medicinal plant.
A6	Explain the basis of complementary and alternative medicines	**a3.** Define the botanical sources and therapeutic uses of phenyl propane derivatives, volatile oils, glycosides , tannins present in medicinal plant.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the role of pharmacist in extraction, isolation and identification of phytochemicals.
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Express the chemical structure of phytochemicals using drawings.
		b2. Differentiate between various types of phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g. bitter principles .
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b3 .** Classify phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g. bitter principles
		b4. Compare between different types of phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g. bitter principles .

B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b5.** Select standard operation procedure to extract, isolate and identify phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g. bitter principles from a plant sample
Professional and practical skills: upon completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
		c2. Operate the instruments and perform experiments successfully in the laboratory
C3	Screen for drugs from different sources and carry out pharmacy relevant experiments successfully.	**c3.** Screen for alkalaoid and terpenoid drugs from plant sources.
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c4 .** Search efficiently for information using documented and electronic sources of information.
		c5. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) ofknowledge& understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the physicochemical properties of phenyl propane derivatives, volatile oils, glycosides , tannins and present in medicinal plant.	**Active Lecture**	**Written exam s**
a2. Discuss the methods and techniques used to extract and isolate phenyl propane derivatives, volatile oils, glycosides tannins and bitter constituents present from medicinal plant.		
a3. Define the botanical sources and therapeutic uses of phenyl propane derivatives, volatile oils, glycosides , tannins present in medicinal plant.		
a4. Describe the role of pharmacist in extraction, isolation and identification of phytochemicals.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Express the chemical structure of phytochemicals using drawings.	**Active Lecture, Feed-back learning**	**Written exams, quizzes**
b3 . Classify phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g. bitter principles .	**Active Lecture**	**Written exam s**
b2. Differentiate between various types of phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g. bitter principles	**Active Lecture, lab. practice**	**Written exam s, lab. term works, final practical exam**
b4. Compare between different types of phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g.		

bitter principles .		
b5. Select standard operation procedure to extract, isolate and identify phenyl propane derivatives, volatile oils, glycosides , tannins and others e.g. bitter principles from a plant sample		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
c3. Screen for alkalaoid and terpenoid drugs from plant sources.		
c4 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning, Group-project**	**Assignments,**
c5. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skillsto Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice, group project**	**lab. term works, final practical exam, assignments**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**Feed-back learning, lab. practice**	**Assignments, lab. term works, final practical exam,**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Phenyl propane derivatives**	a1, a2, a3, a4, b1, b2, b3, b4, b5	Introduction(definition, classification, biogenesis) **Hydroxycinnamic acids (** Definition, classification, biosynthesis, chemical structure, physic-chemical properties, extraction , pharmacological properties and uses **Cinnamic aldhydes and monlignols (** Definition, classification, biosynthesis, chemical structure, physic-chemical properties, extraction , pharmacological properties and uses **Coumarins (** Definition, classification, biosynthesis, chemical structure, physic-chemical properties, extraction , pharmacological properties and uses **Stilbenoids (** Definition, classification, biosynthesis, chemical structure, physic-chemical properties, extraction , pharmacological properties and uses	3	6
2	**Volatile oils**	a1, a2, a3, a4, b1, b2, b3, b4, b5	Definition, classification, distribution and occurrence; Extraction : distillation methods and solvent extraction ; Chemical , physical and pharmacological properties examples of crude drugs containing volatile oils	3	6
Midterm exam				1	2
3	**Glycosides**	a1, a2, a3, a4, b1, b2, b3, b4, b5	Introduction (definition, classification, distribution, extraction, isolation and pharmacological properties) **Cardioactive glycosides (**cardinolides, bufadienolides, sugars, structure activity	3	6

			relationship, distribution, extraction, chemical and physical properties, hydrolysis of cardiac glycosides, biogenesis, pharmacological properties , mechanism of action, chemical tests. Chief drugs containing cardiac glycosides (Digitalis, strophanthus, Adonis, Convalaria and squill). **Saponin glycosides** (definition, classification, distribution, structures,biogenesis,chemical , physical properties , characterization, biological and pharmacological properties. Drugs as expectorant ,antitusive, antiexudative, adaptogens and diuretic) **Anthracen glycosides** (classification, distribution, structures, biosynthesis, extraction , chemical, physical properties, characterization, pharmacological properties, Senna, Rhabarub and Aloe) **Flavonoid glycosides**(classification, biosynthesis, chemical structure, physic-chemical properties, rutin, hesperidin and flavonoid containing drugs) **Cynogentic glycosides** (cynogenesis, distribution, structures, biogenesis, detection, extraction, pharmacological activities and cynogenetic drugs) **Glucosinolates(Thioglycosides):** definition, distribution, structures, biogenesis , hydrolysis, toxicity and drugs containing glucosinolates.		6
4	**Tannins**	a1, a2, a3, a4, b1, b2, b3, b4, b5	definition, classification, structure, distribution, biosynthesis, physic-chemical properties, extraction, biological properties , examples of crude drugs containing tannins	1	2
5	**Steroids**	a1, a2, a3, a4, b1, b2,	Definition, classification, structures , biogenesis, chemical and physical properties and characterization.	1	

		b3, b4, b5			2
6	**Miscellaneous e.g. bitter principles**	a1, a2, a3, a4, b1, b2, b3, b4, b5	Definition, classification, structures , biogenesis, chemical and physical properties and characterization.	1	2
Course Review		a1, a2, a3, a4, b1, b2, b3, b4, b5	Review of the course topics by discussion session.	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	6 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
physicochemical properties , extraction (maceration or percolation or soxhlet extraction) , concentration (if necessary " rotary evaporation', isolation (Thin layer chromatography) and identification of the phytochemicals from crude drugs or parts of medicinal plants				
1.	Phenyl propane derivatives : (cinnamic aldehyde)	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
2.	Volatile oils (peppermint oil)	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
3.	Volatile oils (clove oil)	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
4.	Saponins (Glycyrrhizin)	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
5.	Flavonoids (Hesperetin**)**	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
6.	Flavonoids (apigenin **)**	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
7.	Anthracin Glycoside (sennosides)	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3

8.	Cardiac Glycoside (digoxin)	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
9.	Tannins in Tea	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
10.	Miscellaneous: bitter principles (Khellin)	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
11.	Review	1	2	b2, b4, b5, c1, c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	b2, b4, b5, c1, c2, c3, d1, d2, d3
Total		**12**	**24**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: each student will be assigned solve the problems provided by the teacher. The problems involve nomenclature, isolation , chemical reaction, etc.	c4, c5, d2	4-13	3
2	**Group** : each group of students will be assigned to present 2-3 videos or	c4, c5, d1, d2, d3	14	2

	simulations of one of the studied extraction , isolation techniques.			

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1
		Assignments	7, 12	5	5	c4, c5, d1, d2, d3
2	Mid-semester exam (written exam)		7	10	10	a1, a2, a3, a4, b1, b2, b3, b4, b5
3	Final exam (written exam)		16	50	50	a1, a2, a3, a4, b1, b2, b3, b4, b5
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b2, b4, b5, c1, c2, c3, d1, d2, d3
		Accomplishments		5	5	
2	Final exam (practical)		12	20	20	b2, b4, b5, c1, c2, c3, d1, d2, d3
Total				30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. W.C. Evans, Trease and Evans pharmacognosy, W.B.Saunders
2. Amritpal Singh Saroya, Herbalism, Phytochemistry and Ethnopharmacology, CRC press Jarald.

2- Essential References.

1. Bhandari. Textbook of pharmacognosy

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/SonamkzBhutia/pharmacognosy-and-phytochemistry-ii-theory

IX. Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

TOXICOLOGY

Course Code (**PHR425**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XXXVI. Course Identification and General Information:

22	**Course Title:**	**TOXICOLOGY**			
22	**Course Code &Number:**	**PHR 425**			
22	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	-	-	**2**
23	**Study level/ semester at which this course is offered:**	*(Forth) Year – (2nd) semester*			
23	**Pre –requisite (if any):**	**Pre: PHR412 (Pharmacology & Therapeutics III)**			
23	**Co –requisite (if any):**				
23	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
23	**Language of teaching the course:**	**ENGLISH**			
23	**Location of teaching the course:**	**AT THE UNIVERSITY FICILITY**			
23	**Prepared by**				
23	**Date of Approval**				

L: lecturing ; P: practical ; T.: training

II. Course Description:

This course deals with the study of sources, mode of action, toxic pathophysiological effects, detection, diagnosis and management of poisonous materials including acids, alkalis, metals, metalloids, pesticides, heavy metals, specific chemicals, simple organic compounds, poisoning with materials killing harmful Living organisms and some highly toxic medicines

يتناول هذا المقرر دراسة مصادر ، و اليات التأثير السام ، والتأثيرات المرضية السامة ، و طرق كشف وتشخيص و معالجة المواد السامة و تشمل : الأحماض والقلويات والمبيدات الحشرية والمعادن الثقيلة والمواد الكيميائية الأخرى كالمركبات العضوية البسيطة و مبيدات الكائنات الحية الضارة و بعض الأدوية عالية السمية

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A7	Identify types of poisons and mechanisms and actions of poisoning	**a1.** Identify the mechanism of toxicity with poisonous materials.
		a2. Identify the types of poisonous materials that can threaten human life.
		a3. Describe the clinical features associated with poisoning
		a4. Discuss the methods of poisons detection, diagnosis and management.
A10	Describe the pharmacists role in different pharmacy practices.	**a5.** Describe the role of pharmacist in detection, preventing and management of poisoning.
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1 .** Classify poisonous materials.
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1 .**Search efficiently for information using documented and electronic sources of information.
		c2. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the skills of time management and self-learning.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the mechanism of toxicity with poisonous materials.	**Active Lecture**	**Written exams**
a2. Identify the types of poisonous materials that can threaten human life.		
a3. Describe the clinical features associated with poisoning		
a5. Describe the role of pharmacist in detection, preventing and management of poisoning.		
a4. Discuss the methods of poisons detection, diagnosis and management.	**Active Lecture, feed-back learning**	**Written exams , quizzes**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 . Classify poisonous materials.	**Active Lecture**	**Written exams**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning**	**Assignment**
c2. Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the skills of time management and self-learning.	**Feed-back learning**	**Assignments**

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to toxicology**	a1, a2, a3, a4, a5, b1	• Definitions • fundamentals and scope of toxicology. • Classification of poisons • Causes of toxicity : accidental, commit suicidal, criminal • General harmful effects of poisons • Approaches to manage poisoning • Mode of actions of poisons • Diagnosis and detection of poisoning • General procedure of management of poisoning	1	2
Sources, mode of action, toxic pathophysiological effects, detection, diagnosis and management of the following types of toxicity					
2	**Poisoning with acids and alkalis**	a1, a2, a3, a4, a5, b1	• Acids toxicity • Alkalis toxicity • Salts toxicity	1	2
3	**Poisoning with metals and metalloids**	a1, a2, a3, a4, a5, b1	• Toxicity of copper, selenium, Molybdenum, phosphorus • Iron toxicity	2	4
4	**Poisoning with heavy metals**	a1, a2, a3, a4, a5, b1	Toxicity of Lead, Mercury and Arsenic	2	4
MID-TERM EXAM				1	2
5	**Poisoning with specific chemicals**	a1, a2, a3, a4, a5, b1	• Cynide • Hydrogen sulfide • Carbon monoxide	2	4

6	**Poisoning with simple organic compounds**	a1, a2, a3, a4, a5, b1	• Methanol and Isopropyl Alcohols • hydrocarbons • fuel materials : petroleum , gasoline, etc	2	4
7	**Poisoning with materials killing harmful Living organisms**	a1, a2, a3, a4, a5, b1	• Rodenticides, • insecticdes • herbicides • Fungicides	2	4
8	**Poisoning with some medicinal agents**	a1, a2, a3, a4, a5, b1	• Poisoning with opiates, benzodiazepines • Poisoning with paracetamol and aspirin	1	2
Course Review		a1, a2, a3, a4, a5, b1	Review	1	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	8 Units

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to provide a search-based report on toxicity and management of one poison not included in the study topics.	c1, c2, d1	7	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	a4
		Assignments	7, 12	10	10	c1, c2, d1
2	Mid-semester (written exam)		7	20	20	a1, a2, a3, a4, a5, b1
3	Final exam (written exam)		16	60	60	a1, a2, a3, a4, a5, b1
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. kokate, text book of forensic pharmacy
2. Modern Medical Toxicology, Jaypee Brothers Medical Publishers (P) Ltd

2- Essential References.

1. Casarett & Doull's , Essentials of Toxicology
2. Frank A. Barile, Principles of toxicology Testing R.S. Gaud G.T. Gupta practical physical

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/TSOLEMAN/1-introduction-15583147
2. https://www.slideshare.net/DeepakKumar2053/assignment-on-toxicology

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

TOXICOLOGY

I. Course Identification and General Information:

1.	Course Title:	TOXICOLOGY			
2.	Course Code &Number:	PHR 425			
3.	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		2	-	-	**2**
4.	Study level/ semester at which this course is offered:	*(Fourth) Year – (2nd) semester*			
5.	Pre –requisite (if any):	Pre: PHR412 (Pharmacology & Therapeutics III)			
6.	Co –requisite (if any):				
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FICILITY			
10	Prepared by				
11	Date of Approval				

L: lecturing ; P: practical ; T.: training

II. Course Description:

This course deals with the study of sources, mode of action, toxic pathophysiological effects, detection, diagnosis and management of poisonous materials including acids, alkalis, metals, metalloids, pesticides, heavy metals, specific chemicals, simple organic compounds, poisoning with materials killing harmful Living organisms and some highly toxic medicines

يتناول هذا المقرر دراسة مصادر ، و اليات التأثير السام ، والتأثيرات المرضية السامة ، و طرق كشف وتشخيص و معالجة المواد السامة و تشمل : الأحماض والقلويات والمبيدات الحشرية والمعادن الثقيلة والمواد الكيميائية الأخرى كالمركبات العضوية البسيطة و مبيدات الكائنات الحية الضارة و بعض الأدوية عالية السمية

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A7	Identify types of poisons and mechanisms and actions of poisoning	**a1.** Identify the mechanism of toxicity with poisonous materials.
		a2. Identify the types of poisonous materials that can threaten human life.
		a3. Describe the clinical features associated with poisoning
		a4. Discuss the methods of poisons detection, diagnosis and management.
A10	Describe the pharmacists role in different pharmacy practices.	**a5.** Describe the role of pharmacist in detection, preventing and management of poisoning.
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1 .** Classify poisonous materials.
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1 .**Search efficiently for information using documented and electronic sources of information.
		c2. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the skills of time management and self-learning.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the mechanism of toxicity with poisonous materials.	**Active Lecture**	**Written exams**
a2. Identify the types of poisonous materials that can threaten human life.		
a3. Describe the clinical features associated with poisoning		
a5. Describe the role of pharmacist in detection, preventing and management of poisoning.		
a4. Discuss the methods of poisons detection, diagnosis and management.	**Active Lecture, feed-back learning**	**Written exams , quizzes**

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 . Classify poisonous materials.	**Active Lecture**	**Written exams**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning**	**Assignment**
c2. Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the skills of time management and self-learning.	**Feed-back learning**	**Assignments**

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to toxicology**	a1, a2, a3, a4, a5, b1	• Definitions • fundamentals and scope of toxicology. • Classification of poisons • Causes of toxicity : accidental, commit suicidal, criminal • General harmful effects of poisons • Approaches to manage poisoning • Mode of actions of poisons • Diagnosis and detection of poisoning • General procedure of management of poisoning	1	2
Sources, mode of action, toxic pathophysiological effects, detection, diagnosis and management of the following types of toxicity					
2	**Poisoning with acids and alkalis**	a1, a2, a3, a4, a5, b1	• Acids toxicity • Alkalis toxicity • Salts toxicity	1	2
3	**Poisoning with metals and metalloids**	a1, a2, a3, a4, a5, b1	• Toxicity of copper, selenium, Molybdenum, phosphorus • Iron toxicity	2	4

4	**Poisoning with heavy metals**	a1, a2, a3, a4, a5, b1	Toxicity of Lead, Mercury and Arsenic	2	4
MID-TERM EXAM				1	2
5	**Poisoning with specific chemicals**	a1, a2, a3, a4, a5, b1	• Cynide • Hydrogen sulfide • Carbon monoxide	2	4
6	**Poisoning with simple organic compounds**	a1, a2, a3, a4, a5, b1	• Methanol and Isopropyl Alcohols • hydrocarbons • fuel materials : petroleum , gasoline, etc	2	4
7	**Poisoning with materials killing harmful Living organisms**	a1, a2, a3, a4, a5, b1	• Rodenticides, • insecticdes • herbicides • Fungicides	2	4
8	**Poisoning with some medicinal agents**	a1, a2, a3, a4, a5, b1	• Poisoning with opiates, benzodiazepines • Poisoning with paracetamol and aspirin	1	2
Course Review		a1, a2, a3, a4, a5, b1	Review	1	2
FINAL – EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	8 Units

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to provide a search-based report on toxicity and management of one poison not included in the study topics.	c1, c2, d1	7	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	a4
		Assignments	7, 12	10	10	c1, c2, d1
2	Mid-semester (written exam)		7	20	20	a1, a2, a3, a4, a5, b1
3	Final exam (written exam)		16	60	60	a1, a2, a3, a4, a5, b1
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. kokate, text book of forensic pharmacy
2. Modern Medical Toxicology, Jaypee Brothers Medical Publishers (P) Ltd

2- Essential References.

1. Casarett & Doull's , Essentials of Toxicology
2. Frank A. Barile, Principles of toxicology Testing R.S. Gaud G.T. Gupta practical physical

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/TSOLEMAN/1-introduction-15583147
2. https://www.slideshare.net/DeepakKumar2053/assignment-on-toxicology

IX. Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

APPLIED PHARMACOGNOSY

Course Code (**PHR516**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XXXVII. Course Identification and General Information:

23	**Course Title:**	**APPLIED PHARMACOGNOSY**			
23	**Course Code &Number:**	**PHR516**			
24	**Credit hours:**	C.H			TOTAL
		L.	P.	T.	
		2	1	-	**3**
24	**Study level/ semester at which this course is offered:**	*(5th) Year – (1st) semester*			
24	**Pre –requisite (if any):**	**Pre: PHR424 (Phytochemistry II)**			
24	**Co –requisite (if any):**				
24	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
24	**Language of teaching the course:**	**ENGLISH**			
24	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**			
24	**Prepared by**				
24	**Date of Approval**				

L: lecturing ;; P: practical ; T.: training

II. Course Description:

This course, in its first part, provide students with knowledge in the evidence-based applications of herbal medicines and other natural types as complementary and/or alternative methods for classical Medicine for treatment of human diseases. It helps the students to utilize their knowledge and skills attained from previous courses of (Pharmacognosy I, II and phytochemistry I, II) to achieve that purpose. The second part of the course deals with the techniques and approaches employed to screen active ingredients from plants and other natural sources and to evaluate the specifications of natural products.

يزود هذا المقرر في جزئه الأول ، الطلاب بالمعرفة في التطبيقات القائمة على الأدلة للأدوية العشبية والأنواع الطبيعية الأخرى كطرق تكميلية و / أو بديلة للطب الكلاسيكي لعلاج الأمراض التي تصيب الإنسان. يساعد الطلاب على الاستفادة من معارفهم ومهاراتهم

المكتسبة من المقررات السابقة (علم العقاقير العام 1و 2 و كيمياء العقاقير 1 و2) لتحقيق هذا الغرض. يتناول الجزء الثاني من المقرر التقنيات والأساليب المستخدمة لفحص المكونات النشطة من النباتات والمصادر الطبيعية الأخرى ولتقييم مواصفات المنتجات الطبيعية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A4	Describe analytical methods, principles, design and development techniques	**a1.** Describe the methods employed to screen active ingredients from plants and other natural sources and to evaluate specifications of natural products.
A5	Identify actions of medicines on human body.	**a2**. Identify the actions of products of complementary and alternative medicine on human and their misuse or abuse.
A6	Explain the basis of complementary and alternative medicines	**a3**. Explain the basis of complementary and alternative medicine.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the pharmacists role to screen active ingredients from plants and other natural sources and to evaluate specifications of natural products.
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify the products and methods of complementary and alternative medicine.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b2.** Select a suitable standard operation procedure to evaluate specifications of natural products.
B6	Develop and design suitable methods for extraction of active medicinal agents from various sources.	**b3.** Design a suitable method to screen active ingredients from natural sources.
Professional and practical skills: upon completion of the course, students will be able to:		

C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle safely and efficiently the tools and chemicals used in the laboratory.
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate successfully the instruments used in the laboratory
C3	Screen for drugs from different sources and carry out pharmacy relevant experiments successfully.	**c3.** Screen active medicinal ingredients from plants and other natural sources
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c5 .**Search efficiently for information using documented and electronic sources of information.
		c6. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d4.** Take responsibility for adaption to change misleading and adulteration that may occur in complementary and alternative medicine.
D5	Retrieve essential references of evidence-based to achieve maximal clinical effectiveness	**d5.** Retrieve the essential evidence-based references to obtain correct information relevant to complementary and alternative medicines.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Describe the methods employed to screen active ingredients from plants and other natural sources and to evaluate specifications of natural products.	**Active Lecture**	**Written exams**
a2. Identify the actions of products of complementary and alternative medicine on human and their misuse or abuse.	**Active Lecture**	**Written exams**
a3. Explain the basis of complementary and alternative medicine.		
a4. Describe the pharmacists role to screen active ingredients from plants and other natural sources and to evaluate specifications of natural products.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify the products and methods of complementary and alternative medicine.	**Active Lecture**	**Written exams**
b2. Select a suitable standard operation procedure to evaluate specifications of natural products.	**Active Lecture , Feed-back learning**	**Written exams , Quizzes**
b3. Design a suitable method to screen active ingredients from natural sources.	**Group-project**	**Assignment**

(c) Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle safely and efficiently the tools and chemicals used in the laboratory.	**laboratory practice**	**Lab. term works, final practical exam.**
c2. Operate successfully the instruments used in the laboratory		
c3. Screen active medicinal ingredients from plants and other natural sources		
c5 . Search efficiently for information using documented and electronic sources of information.	**Group project**	**Assignments**
c6. Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**Group project, laboratory practice**	**Assignments , Lab. term works, final practical exam.**
d2. Demonstrate the skills of time management and self-learning.		
d3. Participate efficiently with his colleagues in a team work.		
d4. Take responsibility for adaption to change misleading and adulteration that may occur in complementary and alternative medicine.	**Group project**	**Assignments**
d5. Retrieve the essential evidence-based references to		

obtain correct information relevant to complementary and alternative medicines.		

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to complementary and alternative medicines**	a2, a3, a4, b2	□ The complementary and alternative : definition and concept □ The need to complementary and alternative medicines □ Classification of methods of complementary and alternative medicine : medicinal-based , non-medicinal based , traditional medicine , evidence-based therapies.	1	2
2	**Non-herbal Evidence-based Complementary and alternative therapies**	a2, a3, a4, b2	Principles , applications , benefit/risks of different types of complementary and alternative medicine: 1- Physiotherapy techniques including Chinese acupuncture 2- Homeopathy and anthroposophy 3- Hydrotherapy 4- Other therapies : e.g. electrotherapy	2	4
3	**Herbal Evidence-based Complementary and alternative therapies :** Regulations, risks and specifications	a2, a3, a4, b2	• **Introduction:** Definitions: (herbal medicines, phytotherapy), global use • **Regulations and Reliable sources of information :** -International (WHO monographs), (US-FDA /Medscape), (European union regulations), (UK regulations), other international regulations. - Local (in Yemen) Regulatory • **Risks of herbal medications:** (1)Problems of unregulated herbal medications: substitutions,	4	8

			adulteration, adulteration with toxic substances or synthetic drugs (2) Potential adverse effects of herbal products (3) Risks of herbal medications on : pregnant and lactating women, pediatric, older patients a, cancer patients and other patients (4) Potential Herb-drug interactions • **Quality specifications :** o Pharmacopeial and other regulatory specifications o Licensing herbal medications o Licensed vs unregulated herbal medical products o Clinical-based evidences of herbal medications.		
Mid-term exam				1	2
3	**Herbal Evidence-based Complementary and alternative therapies :** Phytotherapy	a2, a3, a4, b2	• Aromatherapy • Flower remedy therapy • Phytotherapy • Evidence-based uses of these therapies for : o GIT disorders: peptic ulcer, constipation, diarrhea, vomiting, abdominal colic o CVS diseases: hypertension, CHF, angina o Respiratory diseases: Bronchial asthma o Diabetes mellitus o Renal disorders: Renal stones o Bacterial infections	4	8
4	**Phytochemical screening**	a1, a2, a3, a4, b2, a4	• definition and purposes • Techniques and approaches (from traditional-claim to experimental evidence) by schedule screening of specific types of medications including : o Antimicrobial o Wounds-healing drugs o Antioxidant and anticancers o Other drugs	4	8

FINAL - EXAM	1	2
TOTAL	16	32
Number of Weeks /and Units Per Semester	16 weeks	4 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	Extraction, Phytochemical screening and antimicrobial activity of **Myrrh**	**3**	**6**	c1, c2, c3, d1, d2, d3
2.	Extraction, Phytochemical screening and antioxidant activity of **curcuma**	**3**	**6**	c1, c2, c3, d1, d2, d3
3.	Investigations of Pharmacopeial (European pharmacopeia) specifications of different types of **ginger** available in the market	**2**	**4**	c1, c2, c3, d1, d2, d3
4.	Investigations of Pharmacopeial (European pharmacopeia) specifications of different types of **clove** available in the market	**2**	**4**	c1, c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	c1, c2, c3, d1, d2, d3
Total		**11**	**22**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Group** : each group of students will be assigned to provide a search-based report on botanical origin, potential adulteration, potential adverse effects, contraindications , therapeutic use/dose, extraction and screen of phytochemicals for one herbal medicine (each group is assigned with different herbal medicine) using evidence-based references including One or more of the following references: • WHO monographs • FDA/Medscape • Published articles	b3, c5, c6, d1, d2, d3, d4, d5	6-10	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b2
		Assignments	6-10	5	5	b3, c5, c6, d1, d2, d3, d4, d5
2	Mid-semester exam (written exam)		7	10	10	a2, a3, a4, b2
3	Final exam (written exam)		16	50	50	a1, a2, a3, a4, b2
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, c3, d1, d2, d3
		Accomplishments		5	5	
2	Final exam (practical)		12	20	20	c1, c2, c3, d1, d2, d3
			Total	30	30 %	

L. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Complementary and alternative medicine, 2016
2. **Joanne Barnes;** Herbal medicines, 3rd Edition

2- Essential References.

1. European pharmacopeia, 2018

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/FAIMorg/alternative-and-complementary-medicine
2. https://www.slideshare.net/pranayshelokar143/seminar-on-complementary-and-alternative-systen medicine

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

APPLIED PHARMACOGNOSY

I. Course Identification and General Information:

1.	Course Title:	APPLIED PHARMACOGNOSY			
2.	Course Code &Number:	PHR516			
3.	Credit hours:	C.H			TOTAL
		L.	P.	T.	
		2	1	-	3
4.	Study level/ semester at which this course is offered:	*(5th) Year – (1st) semester*			
5.	Pre –requisite (if any):	Pre: PHR424 (Phytochemistry II)			
6.	Co –requisite (if any):				
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FACILITY			
10	Prepared by				
11	Date of Approval				

II. Course Description:

This course, in its first part, provide students with knowledge in the evidence-based applications of herbal medicines and other natural types as complementary and/or alternative methods for classical Medicine for treatment of human diseases. It helps the students to utilize their knowledge and skills attained from previous courses of (Pharmacognosy I, II and phytochemistry I, II) to achieve that purpose. The second part of the course deals with the techniques and approaches employed to screen active ingredients from plants and other natural sources and to evaluate the specifications of natural products.

يزود هذا المقرر في جزئه الأول ، الطلاب بالمعرفة في التطبيقات القائمة على الأدلة للأدوية العشبية والأنواع الطبيعية الأخرى كطرق تكميلية و / أو بديلة للطب الكلاسيكي لعلاج الأمراض التي تصيب الإنسان. يساعد الطلاب على الاستفادة من معارفهم ومهاراتهم المكتسبة من المقررات السابقة (علم العقاقير العام 1و 2 و كيمياء العقاقير 1 و2) لتحقيق هذا الغرض. يتناول الجزء الثاني من المقرر التقنيات والأساليب المستخدمة لفحص المكونات النشطة من النباتات والمصادر الطبيعية الأخرى ولتقييم مواصفات المنتجات الطبيعية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A4	Describe analytical methods, principles, design and development techniques	**a1.** Describe the methods employed to screen active ingredients from plants and other natural sources and to evaluate specifications of natural products.
A5	entify actions of medicines on human body.	**a2.** Identify the actions of products of complementary and alternative medicine on human and their misuse or abuse.
A6	Explain the basis of complementary and alternative medicines	**a3.** Explain the basis of complementary and alternative medicine.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the pharmacists role to screen active ingredients from plants and other natural sources and to evaluate specifications of natural products.
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify the products and methods of complementary and alternative medicine.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b2.** Select a suitable standard operation procedure to evaluate specifications of natural products.
B6	Develop and design suitable methods for extraction of active medicinal agents from various sources.	**b3.** Design a suitable method to screen active ingredients from natural sources.
Professional and practical skills: upon completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle safely and efficiently the tools and chemicals used in the laboratory.
C2	Operate different instruments and use	**c2.** Operate successfully the instruments used

	emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	in the laboratory
C3	Screen for drugs from different sources and carry out pharmacy relevant experiments successfully.	**c3.** Screen active medicinal ingredients from plants and other natural sources
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c5 .**Search efficiently for information using documented and electronic sources of information.
		c6. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d4.** Take responsibility for adaption to change misleading and adulteration that may occur in complementary and alternative medicine.
D5	Retrieve essential references of evidence-based to achieve maximal clinical effectiveness	**d5.** Retrieve the essential evidence-based references to obtain correct information relevant to complementary and alternative medicines.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Describe the methods employed to screen active ingredients from plants and other natural sources and to evaluate specifications of natural products.	**Active Lecture**	**Written exams**
a2. Identify the actions of products of complementary and alternative medicine on human and their misuse or abuse.	**Active Lecture**	**Written exams**
a3. Explain the basis of complementary and alternative medicine.		
a4. Describe the pharmacists role to screen active ingredients from plants and other natural sources and to evaluate specifications of natural products.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify the products and methods of complementary and alternative medicine.	**Active Lecture**	**Written exams**
b2. Select a suitable standard operation procedure to evaluate specifications of natural products.	**Active Lecture , Feed-back learning**	**Written exams , Quizzes**
b3. Design a suitable method to screen active ingredients from natural sources.	**Group-project**	**Assignment**

(c) Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle safely and efficiently the tools and chemicals used in the laboratory.	**laboratory practice**	**Lab. term works, final practical exam.**
c2. Operate successfully the instruments used in the laboratory		
c3. Screen active medicinal ingredients from plants and other natural sources		
c5 . Search efficiently for information using documented and electronic sources of information.	**Group project**	**Assignments**
c6. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**Group project, laboratory practice**	**Assignments , Lab. term works, final practical exam.**
d2. Demonstrate the skills of time management and self-learning.		
d3. Participate efficiently with his colleagues in a team work.		
d4. Take responsibility for adaption to change misleading and adulteration that may occur in complementary and alternative medicine.	**Group project**	**Assignments**
d5. Retrieve the essential evidence-based references to		

obtain correct information relevant to complementary and alternative medicines.		

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to complementary and alternative medicines**	a2, a3, a4, b2	The complementary and alternative : definition and concept The need to complementary and alternative medicines Classification of methods of complementary and alternative medicine : medicinal-based , non-medicinal based , traditional medicine , evidence-based therapies.	1	2
2	**Non-herbal Evidence-based Complementary and alternative therapies**	a2, a3, a4, b2	Principles , applications , benefit/risks of different types of complementary and alternative medicine: 5- Physiotherapy techniques including Chinese acupuncture 6- Homeopathy and anthroposophy 7- Hydrotherapy 8- Other therapies : e.g. electrotherapy	2	4
3	**Herbal Evidence-based Complementary and alternative therapies :** Regulations, risks and specifications	a2, a3, a4, b2	• **Introduction:** Definitions: (herbal medicines, phytotherapy), global use • **Regulations and Reliable sources of information :** -International (WHO monographs), (US-FDA /Medscape), (European union regulations), (UK regulations), other international regulations. - Local (in Yemen) Regulatory • **Risks of herbal medications:** (1)Problems of unregulated herbal medications: substitutions, adulteration, adulteration with toxic substances or synthetic drugs (2) Potential adverse effects of herbal products (3) Risks of herbal medications on : pregnant and lactating women, pediatric, older patients a, cancer patients and other patients (4) Potential Herb-drug interactions • **Quality specifications :** o Pharmacopeial and other regulatory specifications o Licensing herbal medications o Licensed vs unregulated herbal medical products	4	8

			○ Clinical-based evidences of herbal medications.		
Mid-term exam				1	2
3	**Herbal Evidence-based Complementary and alternative therapies :** Phytotherapy	a2, a3, a4, b2	• Aromatherapy • Flower remedy therapy • Phytotherapy • Evidence-based uses of these therapies for : ○ GIT disorders: peptic ulcer, constipation, diarrhea, vomiting, abdominal colic ○ CVS diseases: hypertension, CHF, angina ○ Respiratory diseases: Bronchial asthma ○ Diabetes mellitus ○ Renal disorders: Renal stones ○ Bacterial infections	4	8
4	**Phytochemical screening**	a1, a2, a3, a4, b2, a4	• definition and purposes • Techniques and approaches (from traditional-claim to experimental evidence) by schedule screening of specific types of medications including : ○ Antimicrobial ○ Wounds-healing drugs ○ Antioxidant and anticancers ○ Other drugs	4	8
FINAL – EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	4 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	Extraction, Phytochemical screening and antimicrobial activity of **Myrrh**	**3**	**6**	c1, c2, c3, d1, d2, d3
2.	Extraction, Phytochemical screening and antioxidant activity of **curcuma**	**3**	**6**	c1, c2, c3, d1, d2, d3
3.	Investigations of Pharmacopeial (European pharmacopeia) specifications of different types of **ginger** available in the market	**2**	**4**	c1, c2, c3, d1, d2, d3
4.	Investigations of Pharmacopeial (European pharmacopeia) specifications of different types of **clove** available in the market	**2**	**4**	c1, c2, c3, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	c1, c2, c3, d1, d2, d3
Total		**11**	**22**	

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Laboratory practice: students doing experiments in labs individually or in small groups
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Group** : each group of students will be assigned to provide a search-based report on botanical origin, potential adulteration, potential adverse effects, contraindications , therapeutic use/dose, extraction and screen of phytochemicals for one herbal medicine (each group is assigned with different herbal medicine) using evidence-based references including One or more of the following references: • WHO monographs • FDA/Medscape • Published articles	b3, c5, c6, d1, d2, d3, d4, d5	6-10	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b2
		Assignments	6-10	5	5	b3, c5, c6, d1, d2, d3, d4, d5
2	Mid-semester exam (written exam)		7	10	10	a2, a3, a4, b2
3	Final exam (written exam)		16	50	50	a1, a2, a3, a4, b2
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	c1, c2, c3, d1, d2, d3
		Accomplishments		5	5	
2	Final exam (practical)		12	20	20	c1, c2, c3, d1, d2, d3
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Complementary and alternative medicine,
2. **Joanne Barnes;** Herbal medicines, 3rd Edition

2- Essential References.

1. European pharmacopeia, 2018

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/FAIMorg/alternative-and-complementary-medicine
2. https://www.slideshare.net/pranayshelokar143/seminar-on-complementary-and-alternative-system medicine

IX. Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

CLINICAL PHARMACY I

Course Code (**PHR512**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XXXVIII. Course Identification and General Information:

24	**Course Title:**	**CLINICAL PHARMACY I**			
25	**Course Code &Number:**	**PHR512**			
25	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	**3**
25	**Study level/ semester at which this course is offered:**	*(Fifth) Year – (first) semester*			
25	**Pre –requisite (if any):**	**PHR 426 (Hospital Pharmacy)**			
25	**Co –requisite (if any):**	**None**			
25	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
25	**Language of teaching the course:**	**ENGLISH**			
25	**Location of teaching the course:**	**AT THE UNIVERSITY FALICITY**			
25	**Prepared by**				
25	**Date of Approval**				

L: lecturing ;; P: practical ; Tr.: training

XXXIX. Course Description:

This course is designed to provide the student with essential knowledge and skills necessary to provide pharmaceutical clinical patient-oriented services to patients, in general, and in particular to specific populations of patients including pregnant , pediatric , lactating and geriatric patients. The course is preceded by courses necessary to help the student to evaluate patient case and select safe and effective drugs for them. These course are (pharmacology I, II , III and IV) and (Biopharmaceutics and pharmacokinetics I,II) which concern with pharmacodynamic and pharmacokinetics of drugs, respectively.

تم تصميم هذه المقرر لتزويد الطالب بالمعرفة والمهارات الأساسية اللازمة لتقديم الخدمات الصيدلانية السريرية الموجهة للمرضى بشكل عام ، وعلى وجه الخصوص لمجموعات محددة من المرضى بما في ذلك المرضى الحوامل والأطفال والمرضعات وكبار السن. يسبق هذا المقرر مقررات ضرورية لمساعدة الطالب على تقييم حالة المريض واختيار الأدوية الآمنة والفعالة له. هذه المقررات هي (علم الأدوية 1,2,3,4) و (الصيدلة الحيوية والحركية الدوائية 2,1) التي تختص بالديناميكا الدوائية والحركية الدوائية على التوالي.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

52. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A2	Explain the fundamental of social and behavioral sciences.	**a1**. Explain the impact of good behavior and communication of al clinical pharmacists on their relationship with patients and other healthcare professionals
A5	Identify actions of medicines on human body.	**a2**. Identify the therapeutic uses of medicines, their adverse effects and non-pharmacotherapy measures to aid cure of diseases.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of clinical pharmacists in rational medications use and designing therapeutic regimens for patients
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret clinical features andother disease data to properly recommend safe and effective medications for patients
B7	Formulate and evaluate patient care plan about rational drug use of medications.	**b2.** Formulate and evaluate patient care plan about ration medication use to improve patient safety and drug efficacy
Professional and practical skills: upon completion of the course, students will be able to:		
C4	Advice patients and healthcare professionals to optimize medicines use.	**c1.** Advise patient and healthcare professionals to optimize medicinal uses.
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c2 .**Search efficiently for information using evidence-based sources.
		c3. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		

D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the skills of time management, decision -making and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d2.** Participate effectively with his/her colleagues in a team work
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d3.**Take responsibility for adaption to change needs in clinical pharmacy practice
D5	Retrieve essential references of evidence-based to achieve maximal clinical effectiveness	**d4.**Retrieve essential references of evidence-based practice to achieve maximum clinical effectiveness.

53. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the impact of good behavior and communication of al clinical pharmacists on their relationship with patients and other healthcare professionals	**Active Lecture**	**Written exams**
a2. Identify the therapeutic uses of medicines, their adverse effects and non-pharmacotherapy measures to aid cure of diseases.		
a3. Describe the role of clinical pharmacists in rational medications use and designing therapeutic regimens for patients		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret clinical features andother disease data to properly recommend safe and effective medications for patients	**Active Lecture, feed-back learning (seminar)**	**Written exams , quizzes, seminar assessment**
b2. Formulate and evaluate patient care plan about ration medication use to		

improve patient safety and drug efficacy		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Advise patient and healthcare professionals to optimize medicinal uses.	**Feed-back learning (Seminar)**	**Assignments**
c3. Present and report his/her works correctly using appropriate writing rules and technologies media.		
c2 . Search efficiently for information using evidence-based sources.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the skills of time management, decision -making and self-learning.	**Feed-back learning (Seminar)**	**Assignments**
d2. Participate effectively with his/her colleagues in a team work		
d3. Take responsibility for adaption to change needs in clinical pharmacy practice		
d4. Retrieve essential references of evidence-based practice to achieve maximum clinical effectiveness.		

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to clinical pharmacy**	a1, a2, a3, b1, b2	• Definition • Patients-oriented services: clinical, hospital, community pharmacy; inter-relations and differences • Pharmacy from dispensing service to caregiving • Duties of clinical pharmacist • Clinical pharmacists as drug information center: source of information, types of drug information demanded (indications, contraindications, precautions, drug interactions, etc.) • basic requirements (knowledge and skills) of clinical pharmacist	1	2
2	**Clinical pharmacist as a member of the health care team**	a1, a2, a3, b1, b2	○ sharing in morning rotation and discussion , cooperation with other members ○ patient`s medical record (PMR): components, examples ○ Skills of communication with patients	1	2
3	**Clinical skills of diagnosis and data interpretation**	a1, a4, b1, b2, b3, b5, d4	• Clinical features • Physical (clinical) examinations: methods and interpretation • Vital signs evaluation and interpretation • Clinical lab. Data interpretation: blood analysis (CBC, serology, biochemistry, tumor markers), stool analysis, urine analysis. • Clinical instrumental diagnosis: techniques and data interpretation: Radiography, ultrasonography, Computed Tomography Scan (CT scan), Magnetic Resonance	**3**	6

			Imaging		
4	**Seminar 1**	c1, c2 c3, d1, d2, d3, d4	Interpretation of clinical features, lab. diagnosis and instrumental diagnosis of clinical cases provided by the teacher at the end of previous lecture	**1**	2
Mid-term exam				1	2
4	**Non-pharmacotherapy measures**	a1, a2, a3, a4, c1	• Definition, types • Physiotherapy : role, advantages • Psychotherapy : role, advantages • Life-style changes • Diet control • Other methods	1	2
5	**Benefit: Risk ratio**	a1, a2, a3, a4, c1	• Benefits of medications • Risks of medications • Methods for Assessment benefit: risk ratio **<u>with clinical case`s examples</u>**	1	2
6	**Seminar 2**	c1, c2 c3, d1, d2, d3, d4	Seminar on assessment of benefit: risk ratio for clinical cases provided by the teacher at the end of previous lecture	1	2
7	**Pharmacotherapy for specialized population (1)**	a1, a2, a3, b1, b2	**<u>Pharmacotherapy accompanied withclinical cases for</u>:** 1. **Pregnant women**: Harmful effects on the fetus, Recognition of teratogenic drugs, pharmacokinetics in pregnancy, drugs prescribed in pregnancy (Pregnancy A, B, C, X categories), drugs prescribed for [pain, GIT disorders, diabetes, gestational diabetes, asthma, cough, allergy, urinary tract infection, hypertension, thyroid abnormalities,	**2**	4

			thromboembolism, inflectional vaginosis, Epilepsy, mental health disorders] 2. **lactating women:** factors influence the amount of drug an infant will receive through breast-feeding, drugs avoided during lactation, treatment of mastitis, postpartum depression, cessation of lactation)		
8	**Seminar 3**	c1, c2 c3, d1, d2, d3, d4	Seminar to solve clinical cases of pregnant and lactating women	**1**	2
9	**Pharmacotherapy for specialized population (2)**	a1, a2, a3, b1, b2	3. **Pediatrics:** classification of pediatrics (newborn, infant, child), differences of pharmacodynamics and pharmacokinetics and admiration sites of drugs in children, drug efficacy and toxicity, factors affecting pediatric therapy, drugs prescribed for [pain, fever, infections, GIT disorders]. 4. **Geriatrics:** relation of aging to diseases, common physiological changes in aging, alteration of pharmacokinetics and pharmacodynamics of drugs, drugs risks in elderly, drugs avoided in geriatric patients	**2**	4
10	**Seminar 4**	c1, c2 c3, d1, d2, d3, d4	Seminar to solve clinical cases of pregnant and lactating women	**1**	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	10 Units

LI. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning (Seminar) : Each group of students will be assigned to solve a number of case studies prepared by the teacher

LVI. Assignments

At the specified time due , group(s) of students will be assigned by the teacher to present a seminar about one topic. The seminar include power point presentation followed by discussion and questions from the teacher and other students

No	Topic	Aligned CILOs	Week Due
1	Interpretation of clinical data	c1, c2 c3, d1, d2, d3, d4	6
2	Benefit: risk ratio	c1, c2 c3, d1, d2, d3, d4	10
3	Seminar to solve clinical cases of pregnant and lactating women	c1, c2 c3, d1, d2, d3, d4	13
4	Seminar to solve clinical cases of pediatric and geriatric	c1, c2 c3, d1, d2, d3, d4	15

VII. Schedule of Assessment Tasks for Students During the Semester

Assessment Method			Mark	Proportion to Total course Assessment %	**Aligned CILOs**
Term Works	Quizzes		5	5	b1
	Assignments	Presentation	15	15	c1, c2 c3, d1, d2, d3, d4
		Seminar discussion			
Mid-semester exam (written exam)			20	20	
Final exam (written exam)			60	60	a1, a2, a3, b1, b2
Total			100	100	a1, a2, a3, b1, b2

LI. Learning Resources:

1- Required Textbook(s) (ma3imum two).

30. Karen J. Tietze. Clinical skills for pharmacists : A Patient-Focused Approach, Elsevier Inc.
31. James M. Ritter , A text book of clinical pharmacology and therapeutics, HodderArn

2- Essential References.

1. Joseph T. Diprio, Encyclopaedia of clinical pharmacy, Marcel Dekker.
2. Widmann. Good clinical interpretation of laboratory tests

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/SohanPatel8/clinical-pharmacy-57774896

XLI. Course Policies:	
145.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
146.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
147.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
148.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
149.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
150.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Course Plan (Syllabus) of

CLINICAL PHARMACY I

I. Course Identification and General Information:

1.	Course Title:	CLINICAL PHARMACY I			
2.	Course Code &Number:	PHR512			
3.	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	3
4.	Study level/ semester at which this course is offered:	*(Fifth) Year – (first) semester*			
5.	Pre –requisite (if any):	PHR 426 (Hospital Pharmacy)			
6.	Co –requisite (if any):	None			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FALICITY			
10	Prepared by				
11	Date of Approval				

L: lecturing ;; P: practical ; Tr.: training

II. Course Description:

This course is designed to provide the student with essential knowledge and skills necessary to provide pharmaceutical clinical patient-oriented services to patients, in general, and in particular to specific populations of patients including pregnant , pediatric , lactating and geriatric patients. The course is preceded by courses necessary to help the student to evaluate patient case and select safe and effective drugs for them. These course are (pharmacology I, II , III and IV) and (Biopharmaceutics and pharmacokinetics I,II) which concern with pharmacodynamic and pharmacokinetics of drugs, respectively.

تم تصميم هذه المقرر لتزويد الطالب بالمعرفة والمهارات الأساسية اللازمة لتقديم الخدمات الصيدلانية السريرية الموجهة للمرضى بشكل عام ، وعلى وجه الخصوص لمجموعات محددة من المرضى بما في ذلك المرضى الحوامل والأطفال والمرضعات وكبار السن. يسبق هذا المقرر مقررات ضرورية لمساعدة الطالب على تقييم حالة المريض واختيار الأدوية الآمنة والفعالة له. هذه المقررات هي (علم الأدوية 1,2,3,4) و (الصيدلة الحيوية والحركية الدوائية 2,1) التي تختص بالديناميكا الدوائية والحركية الدوائية على التوالي.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

54. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A2	Explain the fundamental of social and behavioral sciences.	**a1**. Explain the impact of good behavior and communication of al clinical pharmacists on their relationship with patients and other healthcare professionals
A5	Identify actions of medicines on human body.	**a2**. Identify the therapeutic uses of medicines, their adverse effects and non-pharmacotherapy measures to aid cure of diseases.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of clinical pharmacists in rational medications use and designing therapeutic regimens for patients
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret clinical features andother disease data to properly recommend safe and effective medications for patients
B7	Formulate and evaluate patient care plan about rational drug use of medications.	**b2.** Formulate and evaluate patient care plan about ration medication use to improve patient safety and drug efficacy
Professional and practical skills: upon completion of the course, students will be able to:		
C4	Advice patients and healthcare professionals to optimize medicines use.	**c1.** Advise patient and healthcare professionals to optimize medicinal uses.
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c2 .**Search efficiently for information using evidence-based sources.
		c3. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		

D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the skills of time management, decision -making and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d2.** Participate effectively with his/her colleagues in a team work
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d3.**Take responsibility for adaption to change needs in clinical pharmacy practice
D5	Retrieve essential references of evidence-based to achieve maximal clinical effectiveness	**d4.**Retrieve essential references of evidence-based practice to achieve maximum clinical effectiveness.

55. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the impact of good behavior and communication of al clinical pharmacists on their relationship with patients and other healthcare professionals	**Active Lecture**	**Written exams**
a2. Identify the therapeutic uses of medicines, their adverse effects and non-pharmacotherapy measures to aid cure of diseases.		
a3. Describe the role of clinical pharmacists in rational medications use and designing therapeutic regimens for patients		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret clinical features andother disease data to properly recommend safe and effective medications for patients	**Active Lecture, feed-back learning (seminar)**	**Written exams , quizzes, seminar assessment**
b2. Formulate and evaluate patient care plan about ration medication use to		

improve patient safety and drug efficacy		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Advise patient and healthcare professionals to optimize medicinal uses.	**Feed-back learning (Seminar)**	**Assignments**
c3. Present and report his/her works correctly using appropriate writing rules and technologies media.		
c2 . Search efficiently for information using evidence-based sources.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the skills of time management, decision -making and self-learning.	**Feed-back learning (Seminar)**	**Assignments**
d2. Participate effectively with his/her colleagues in a team work		
d3. Take responsibility for adaption to change needs in clinical pharmacy practice		
d4. Retrieve essential references of evidence-based practice to achieve maximum clinical effectiveness.		

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to clinical pharmacy**	a1, a2, a3, b1, b2	• Definition • Patients-oriented services: clinical, hospital, community pharmacy; inter-relations and differences • Pharmacy from dispensing service to caregiving • Duties of clinical pharmacist • Clinical pharmacists as drug information center: source of information, types of drug information demanded (indications, contraindications, precautions, drug interactions, etc.) • basic requirements (knowledge and skills) of clinical pharmacist	1	2
2	**Clinical pharmacist as a member of the health care team**	a1, a2, a3, b1, b2	○ sharing in morning rotation and discussion , cooperation with other members ○ patient`s medical record (PMR): components, examples ○ Skills of communication with patients	1	2
3	**Clinical skills of diagnosis and data interpretation**	a1, a4, b1, b2, b3, b5, d4	• Clinical features • Physical (clinical) examinations: methods and interpretation • Vital signs evaluation and interpretation • Clinical lab. Data interpretation: blood analysis (CBC, serology, biochemistry, tumor markers), stool analysis, urine analysis. • Clinical instrumental diagnosis: techniques and data interpretation: Radiography, ultrasonography, Computed Tomography Scan (CT scan), Magnetic Resonance	**3**	6

			Imaging		
4	**Seminar 1**	c1, c2 c3, d1, d2, d3, d4	Interpretation of clinical features, lab. diagnosis and instrumental diagnosis of clinical cases provided by the teacher at the end of previous lecture	**1**	2
Mid-term exam				1	2
4	**Non-pharmacotherapy measures**	a1, a2, a3, a4, c1	• Definition, types • Physiotherapy : role, advantages • Psychotherapy : role, advantages • Life-style changes • Diet control • Other methods	1	2
5	**Benefit: Risk ratio**	a1, a2, a3, a4, c1	• Benefits of medications • Risks of medications • Methods for Assessment benefit: risk ratio **<u>with clinical case`s examples</u>**	1	2
6	**Seminar 2**	c1, c2 c3, d1, d2, d3, d4	Seminar on assessment of benefit: risk ratio for clinical cases provided by the teacher at the end of previous lecture	1	2
7	**Pharmacotherapy for specialized population (1)**	a1, a2, a3, b1, b2	**<u>Pharmacotherapy accompanied withclinical cases for</u>:** 2. **Pregnant women**: Harmful effects on the fetus, Recognition of teratogenic drugs, pharmacokinetics in pregnancy, drugs prescribed in pregnancy (Pregnancy A, B, C, X categories), drugs prescribed for [pain, GIT disorders, diabetes, gestational diabetes, asthma, cough, allergy, urinary tract infection, hypertension, thyroid abnormalities,	**2**	4

			thromboembolism, inflectional vaginosis, Epilepsy, mental health disorders] 5. **lactating women:** factors influence the amount of drug an infant will receive through breast-feeding, drugs avoided during lactation, treatment of mastitis, postpartum depression, cessation of lactation)		
8	**Seminar 3**	c1, c2 c3, d1, d2, d3, d4	Seminar to solve clinical cases of pregnant and lactating women	**1**	2
9	**Pharmacotherapy for specialized population (2)**	a1, a2, a3, b1, b2	6. **Pediatrics:** classification of pediatrics (newborn, infant, child), differences of pharmacodynamics and pharmacokinetics and admiration sites of drugs in children, drug efficacy and toxicity, factors affecting pediatric therapy, drugs prescribed for [pain, fever, infections, GIT disorders]. 7. **Geriatrics:** relation of aging to diseases, common physiological changes in aging, alteration of pharmacokinetics and pharmacodynamics of drugs, drugs risks in elderly, drugs avoided in geriatric patients	**2**	4
10	**Seminar 4**	c1, c2 c3, d1, d2, d3, d4	Seminar to solve clinical cases of pregnant and lactating women	**1**	2
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	10 Units

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning (Seminar) : Each group of students will be assigned to solve a number of case studies prepared by the teacher

VI. Assignments

At the specified time due , group(s) of students will be assigned by the teacher to present a seminar about one topic. The seminar include power point presentation followed by discussion and questions from the teacher and other students

No	Topic	Aligned CILOs	Week Due
1	Interpretation of clinical data	c1, c2 c3, d1, d2, d3, d4	6
2	Benefit: risk ratio	c1, c2 c3, d1, d2, d3, d4	10
3	Seminar to solve clinical cases of pregnant and lactating women	c1, c2 c3, d1, d2, d3, d4	13
4	Seminar to solve clinical cases of pediatric and geriatric	c1, c2 c3, d1, d2, d3, d4	15

VII. Schedule of Assessment Tasks for Students During the Semester

Assessment Method			Mark	Proportion to Total course Assessment %	**Aligned CILOs**
Term Works	Quizzes		5	5	b1
	Assignments	Presentation	15	15	c1, c2 c3, d1, d2, d3, d4
		Seminar discussion			
Mid-semester exam (written exam)			20	20	
Final exam (written exam)			60	60	a1, a2, a3, b1, b2
Total			100	100	a1, a2, a3, b1, b2

VIII. Learning Resources:

1- Required Textbook(s) (ma3imum two).

1. Karen J. Tietze. Clinical skills for pharmacists : A Patient-Focused Approach, Elsevier Inc.
2. James M. Ritter , A text book of clinical pharmacology and therapeutics, HodderArn

2- Essential References.

1. Joseph T. Diprio, Encyclopaedia of clinical pharmacy, Marcel Dekker.
2. Widmann. Good clinical interpretation of laboratory tests

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/SohanPatel8/clinical-pharmacy-57774896

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

INDUSTRIAL PHARMACY

Course Code (**PHR513**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XL. Course Identification and General Information:

26	**Course Title:**	**INDUSTRIAL PHARMACY**			
26	**Course Code &Number:**	**PHR513**			
26	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	-	-	**2**
26	**Study level/ semester at which this course is offered:**	*(5th) Year – (1st) semester*			
26	**Pre –requisite (if any):**	-------			
26	**Co –requisite (if any):**	**Co: PHR514 (Quality control)**			
26	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
26	**Language of teaching the course:**	**ENGLISH**			
26	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**			
26	**Prepared by**				
27	**Date of Approval**				

L: lecturing ; P: practical ; T.: training

XLI. Course Description:

This course deals with the study of criteria of good practices relevant to manufacturing of medications in drug plants . These criteria include current good manufacturing practice (cGMP) , good storage practice (cGSP) and good laboratory practice (cGLP) that are based on global guidelines such as ICH, WHO and ISO. The course also concerns with and the substantial unit operations utilized during manufacturing of these products including those involved in transfer of materials, those applied prior and after mixing of ingredients and those employed in filling and packaging of finished products.

يتناول هذا المقرر الدراسي دراسة معايير الممارسات الجيدة ذات الصلة بتصنيع الأدوية في مصانع الأدوية. تشمل هذه المعايير ممارسات التصنيع الجيدة الحالية (cGMP) وممارسات التخزين الجيدة (cGSP) والممارسات المعملية الجيدة (cGLP) التي تستند إلى إرشادات عالمية مثل ICH و WHO و ISO. يهتم المقرر أيضًا بعمليات الوحدة الأساسية المستخدمة أثناء تصنيع هذه المنتجات بما في ذلك تلك المستخدمة في نقل المواد ، وتلك التي يتم تطبيقها قبل وبعد خلط المكونات وتلك المستخدمة في تعبئة وتعبئة المنتجات النهائية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

56. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A4	Describe analytical methods, principles, design and development techniques	**a1.** Identify criteria for good practice of pharmaceutical manufacturing including cGMP, cGSP, cGLP based on ICH, WHO and ISO guidelines.
		a2. Describe the different types unit-operation methods used for pharmaceutical manufacturing and their advantages/disadvantages
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in employment GMP criteria and to operate unit operations for manufacturing of drug products.
Intellectual skills: upon completion of the course, students will be able to:		
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b1.** Select standard operation procedure to obtain in-process and finished products with specific criteria
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1 .**Search efficiently for information using documented and electronic sources of information.
		c2. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision	**d2.** Demonstrate the skills of time management and self-learning.

	making.	
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

57. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify criteria for good practice of pharmaceutical manufacturing including cGMP, cGSP, cGLP based on ICH, WHO and ISO guidelines.	**Active Lecture**	**written exams**
a2. Describe the different types unit-operation methods used for pharmaceutical manufacturing and their advantages/disadvantages		
a3. Describe the role of pharmacist in employment GMP criteria and to operate unit operations for manufacturing of drug products.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Select standard operation procedure to obtain in-process and finished products with specific criteria	**feed-back learning**	**Written exam, quizzes, assignments**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Search efficiently for information using documented and electronic sources of information.	**Feed-back learning**	**Assignments**
c2. Present and report his/her works correctly using		

appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**group-project**	**Assignments**
d2. Demonstrate the skills of time management and self-learning.		
d3. Participate efficiently with his colleagues in a team work.		

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to industrial pharmacy and criteria of good practices**	a1, a2, a3, b1	• The need and Significance for large-scale production of drugs • history of large scale manufacturing of drug products. • Criteria of current good practices : good manufacturing practice (cGMP), good storage practice(cGSP)and good laboratory practice (cGLP) to be emplyed in drug plants based on specific guidelines such as WHO, ICH and ISO	3	6
2	**General principles of flow and transfer**	a1, a2, a3, b1	Design, types, advantages, disadvantage, selection of machines used for: a. mass transfer b. fluid flow c. heat transfer	2	4
3	**Fundamental premixing unit operations (applied to fluids)**	a1, a2, a3, b1	Design, types, advantages, disadvantage, selection of machines used for: a. fluid clarification o Filtration o Centrifugation b. Solvent Extraction c. Evaporation d. Distillation	2	4
			• MID-TERM EXAM	1	2
4	**Fundamental premixing unit operations (applied to solids)**	a1, a2, a3, b1	Types, advantages, disadvantage, machine design and operation used for: a. crystallization b. drying c. particle size reduction (milling) d. particle size enlargement (granulation)	3	6

5	**Mixing unit operation**	a1, a2, a3, b1	Types, advantages, disadvantage, machine design and operation used for: a. Solid-solid mixing b. Solid-fluid and fluid-fluid mixing c. Semisolid mixing	2	4
6	**Filling and packaging Processes**	a1, a2, a3, b1	Types, advantages, disadvantage, machine design and operation used for: a. Filling of finished product b. packaging.(including types of packaging materials)	2	4
Course Review		a1, a2, a3, b1	Review of the course topics by discussion session.	1	2
FINAL – EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	6 Units

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Group :** The teacher will provide the students with a number of problems related to operation and production studied in this course. The student group is assigned to provide a search-based technical solutions of one of those problems	c1, c2, d1, d2, d3	5-12	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b1
		Assignments	7, 12	10	10	c1, c2, d1
2	Mid-semester exam (written exam)		7	20	20	a1, a2, a3, b1
3	Final exam (written exam)		16	60	60	a1, a2, a3, b1
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Aulton M.E., Pharmaceutics: the science of dosage form design, 2012, Churchill Livingstone
2. Lachman, Theory and Practice of Industrial Pharmacy

2- Essential References.

1. Vidya. pharmaceutical industrial management Chandrasekhar. Pharmaceutical engineering
2. Jyothi. pharmaceutical engineering

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/AswaNasir/industrial-pharmacy-ppt
2. https://www.slideshare.net/WilliamDube1/industrial-pharmacy

XLII. Course Policies:

151.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
152.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
153.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
154.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
155.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
156.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

INDUSTRIAL PHARMACY

I. Course Identification and General Information:

1.	Course Title:	INDUSTRIAL PHARMACY			
2.	Course Code &Number:	PHR513			
3.	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		2	-	-	**2**
4.	Study level/ semester at which this course is offered:	*(5th) Year – (1st) semester*			
5.	Pre –requisite (if any):	-------			
6.	Co –requisite (if any):	Co: PHR514 (Quality control)			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FACILITY			
10	Prepared by				
11	Date of Approval				

L: lecturing ; P: practical ; T.: training

II. Course Description:

This course deals with the study of criteria of good practices relevant to manufacturing of medications in drug plants . These criteria include current good manufacturing practice (cGMP) , good storage practice (cGSP) and good laboratory practice (cGLP) that are based on global guidelines such as ICH, WHO and ISO. The course also concerns with and the substantial unit operations utilized during manufacturing of these products including those involved in transfer of materials, those applied prior and after mixing of ingredients and those employed in filling and packaging of finished products.

يتناول هذا المقرر الدراسي دراسة معايير الممارسات الجيدة ذات الصلة بتصنيع الأدوية في مصانع الأدوية. تشمل هذه المعايير ممارسات التصنيع الجيدة الحالية (cGMP) وممارسات التخزين الجيدة (cGSP) والممارسات المعملية الجيدة (cGLP) التي تستند إلى إرشادات عالمية مثل ICH و WHO و ISO. يهتم المقرر أيضًا بعمليات الوحدة الأساسية المستخدمة أثناء تصنيع هذه المنتجات بما في ذلك تلك المستخدمة في نقل المواد ، وتلك التي يتم تطبيقها قبل وبعد خلط المكونات وتلك المستخدمة في تعبئة وتعبئة المنتجات النهائية.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A4	Describe analytical methods, principles, design and development techniques	**a1.** Identify criteria for good practice of pharmaceutical manufacturing including cGMP, cGSP, cGLP based on ICH, WHO and ISO guidelines.
		a2. Describe the different types unit-operation methods used for pharmaceutical manufacturing and their advantages/disadvantages
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacist in employment GMP criteria and to operate unit operations for manufacturing of drug products.
Intellectual skills: upon completion of the course, students will be able to:		
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b1.** Select standard operation procedure to obtain in-process and finished products with specific criteria
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1 .**Search efficiently for information using documented and electronic sources of information.
		c2. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision	**d2.** Demonstrate the skills of time management and self-learning.

	making.	
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify criteria for good practice of pharmaceutical manufacturing including cGMP, cGSP, cGLP based on ICH, WHO and ISO guidelines.	**Active Lecture**	**written exams**
a2. Describe the different types unit-operation methods used for pharmaceutical manufacturing and their advantages/disadvantages		
a3. Describe the role of pharmacist in employment GMP criteria and to operate unit operations for manufacturing of drug products.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Select standard operation procedure to obtain in-process and finished products with specific criteria	**feed-back learning**	**Written exam, quizzes, assignments**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Search efficiently for information using documented and electronic sources of information.	**Feed-back learning**	**Assignments**
c2. Present and report his/her works correctly using appropriate writing rules and technologies media.		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**group-project**	**Assignments**
d2. Demonstrate the skills of time management and self-learning.		
d3. Participate efficiently with his colleagues in a team work.		

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to industrial pharmacy and criteria of good practices**	a1, a2, a3, b1	• The need and Significance for large-scale production of drugs • history of large scale manufacturing of drug products. • Criteria of current good practices : good manufacturing practice (cGMP), good storage practice(cGSP)and good laboratory practice (cGLP) to be emplyed in drug plants based on specific guidelines such as WHO, ICH and ISO	3	6
2	**General principles of flow and transfer**	a1, a2, a3, b1	Design, types, advantages, disadvantage, selection of machines used for: a. mass transfer b. fluid flow c. heat transfer	2	4
3	**Fundamental premixing unit operations (applied to fluids)**	a1, a2, a3, b1	Design, types, advantages, disadvantage, selection of machines used for: a. fluid clarification o Filtration o Centrifugation b. Solvent Extraction c. Evaporation d. Distillation	2	4
			• MID-TERM EXAM	1	2
4	**Fundamental premixing unit operations (applied to solids)**	a1, a2, a3, b1	Types, advantages, disadvantage, machine design and operation used for: a. crystallization b. drying c. particle size reduction (milling) d. particle size enlargement (granulation)	3	6

5	**Mixing unit operation**	a1, a2, a3, b1	Types, advantages, disadvantage, machine design and operation used for: a. Solid-solid mixing b. Solid-fluid and fluid-fluid mixing c. Semisolid mixing	2	4
6	**Filling and packaging Processes**	a1, a2, a3, b1	Types, advantages, disadvantage, machine design and operation used for: a. Filling of finished product b. packaging.(including types of packaging materials)	2	4
Course Review		a1, a2, a3, b1	Review of the course topics by discussion session.	1	2
FINAL – EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	6 Units

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Group :** The teacher will provide the students with a number of problems related to operation and production studied in this course. The student group is assigned to provide a search-based technical solutions of one of those problems	c1, c2, d1, d2, d3	5-12	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b1
		Assignments	7, 12	10	10	c1, c2, d1
2	Mid-semester exam (written exam)		7	20	20	a1, a2, a3, b1
3	Final exam (written exam)		16	60	60	a1, a2, a3, b1
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Aulton M.E., Pharmaceutics: the science of dosage form design, 2012, Churchill Livingstone
2. Lachman, Theory and Practice of Industrial Pharmacy

2- Essential References.

1. Vidya. pharmaceutical industrial management Chandrasekhar. Pharmaceutical engineering
2. Jyothi. pharmaceutical engineering

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/AswaNasir/industrial-pharmacy-ppt
2. https://www.slideshare.net/WilliamDube1/industrial-pharmacy

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

NUCLEAR PHARMACY

Course Code (**PHR515**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XLII. Course Identification and General Information:					
27	**Course Title:**	**NUCLEAR PHARMACY**			
27	**Course Code &Number:**	**PHR 515**			
27	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	-	-	**2**
27	**Study level/ semester at which this course is offered:**	*(FIFTH) Year – (1st) semester*			
27	**Pre –requisite (if any):**				
27	**Co –requisite (if any):**				
27	**Program (s) in which the course is**	**Pharmacy Bachelor**			

	offered:	
27	**Language of teaching the course:**	**ENGLISH**
27	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**
28	**Prepared by**	
28	**Date of Approval**	

XLIII. Course Description:

This course concerns with the study of radiopharmaceuticals. In the first part it introduces knowledge of radiations (in particular those used in medical/pharmaceutical purposes), types of radiations, elements that emit radiation, and production and labeling methods , risks management and dosing . The second part focus on radiopharmaceuticals used for diagnosis and treatment of human diseases.

يهتم هذا المقرر بدراسة الأدوية المشعة و يبدأ المقرر في الجزء الأول بمقدمة عامة عن الإشعاعات (خصوصا المستخدمة منها في المجال الطبي و الصيدلاني) و انواعها و العناصر التي تنبعث منها وطرق تصنيع الأدوية المشعة ، وإدارة مخاطرها ، وطرق تحديد جرعاتها ثم يركز الجزء الثاني من المقرر على أهم أنواع الأدوية المشعة المستخدمة في تشخيص و معالجة الأمراض البشرية

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

58. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Explain the physicochemical properties of radionuclides, radioisotopes , radioisomers and radiopharmaceuticals.
A4	Describe analytical methods, principles, design and development techniques	**a2.** Describe the analytical methods used for measurement of radioactivity , radiodiagnosis of human diseases and quality evaluation of radiopharmaceuticals.
A5	Identify actions of medicines on human body.	**a3**. Identify actions of radiations and

		radiopharmaceuticals in human.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the role of pharmacist in safe and effective radiopharmaceutical administration.
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify radiations, radionuclides and radiopharmaceuticals.
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b2 .**Apply calculations to measure radioactivity and radiopharmaceutical doses.
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1 .**Search efficiently for information using documented and electronic sources of information.
		c2. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate time management and self-learning skills.

59. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge& understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the physicochemical properties of radionuclides, radioisotopes , radioisomers and radiopharmaceuticals.	**Active Lecture**	**Written exams**
a2. Describe the analytical methods used for measurement of radioactivity , radiodiagnosis of		

human diseases and quality evaluation of radiopharmaceuticals.		
a3. Identify actions of radiations and radiopharmaceuticals in human.		
a4. Describe the role of pharmacist in safe and effective radiopharmaceutical administration.		
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify radiations, radionuclides and radiopharmaceuticals.	**Active Lecture**	**Written exams**
b2 . Apply calculations to measure radioactivity and radiopharmaceutical doses.	**Active Lecture , feed-back learning**	**Written exams , Quizzes**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning**	**Assignments**
c2. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies

d1. Demonstrate time management and self-learning skills.	**feed-back learning**	**Assignments**

V. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction To Nuclear pharmacy**	a1, a2, a3, a4, b1, b2	• Definitions : nuclear medicine, nuclear pharmacy, , radiopharmaceuticals). • Regulations of nuclear pharmacy • Significance of nuclear pharmacy • Interior design and location of a nuclear pharmacy • The basics of atom radioactivity : atom nuclear structure, types of particles. • Radioactivity: lower, high energy, theories • Radionuclides, radioisotopes, radioisomers, normal atoms vs. radionuclides	2	4

			• Types of radiations : ionizing, non-ionizing. Differences and types • Ionizing radiations : Particle radiations (α, β), wave radiations (gamma radiations, X-rays) properties. • Risks of radiations: types of risks, factors affecting risks		
2	**Radioactivity**	a1, a2, a3, a4, b1, b2	• Radioactivity: types of radioactive substances (natural, artificial) • Properties of commonly used radionuclides • Units of measurement of radioactivity • Half-lives : physical, biological, effective • Kinetics of radioactivity • Calculation of radiation exposure • calculation of radiation absorbed by man • calculation of dose of radiopharmaceutical: dose as Ci or Bq, as µg as rad/mCi	3	6
3	**Introduction to Radiopharmaceuticals**	a1, a2, a3, a4, b1, b2	• Definition and components of radiopharmaceutical • Production and labeling • classification • properties of ideal radiopharmaceutical • Routes of administration • Administration procedures: dose calibrator	2	4
Mid-term exam				1	2

4	**Diagnostic radiopharmaceuticals**	a1, a2, a3, a4, b1, b2	**I. In vitro diagnostic methods** o Radioimmunoassay o Schilling test o Blood volume determination **II. In vivo (Imaging diagnostic radiopharmaceuticals):** (i) **Gamma camera techniques:** scintillation, SPECT techniques , types , doses and adverse effects for o Heart imaging o Brain imaging o Kidney imaging o Thyroid and parathyroid imaging o Lung imaging o Bone and joint imaging o Liver imaging o Infection and inflammation imaging **(ii) Positron emission tomography (PET)** o Advantages o Disadvantages o Radionuclides and Radiopharmaceuticals used for imaging	4	8
5	**Therapeutic Radiopharmaceuticals**	a1, a2, a3, a4, b1, b2	• General properties of radiotherapeutics • Types , doses and adverse effects for Radiopharmaceuticals used for therapy of : o Hyperthyroidism o Thyroid cancer o Bone metastasis o Neuroendocrine digestive system tumor o Prostate cancer o Liver cancer o Non-Hodking lymphoma o Polycythemia and leukemia	2	4

6	**Quality control of radiopharmaceuticals**	a2, a4	• Physicochemical tests • Radioactive purity • Radiochemical purity • Chemical purity • Radioassay • Biological tests: sterility, apyrogenicity	1	
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	6 Units

VI. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of

maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VII. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to provide a search-based report on one radiopharmaceutical product.	c1, c2, d1	4-13	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term	Quizzes	4-13, 14	10	10	b2

	Works	Assignments	7, 12	10	10	c1, c2, d1
2	Mid-semester exam (written exam)		7	20	20	a1, a2, a3, a4, b1, b2
3	Final exam of (written exam)		16	60	60	a1, a2, a3, a4, b1, b2
			TOTAL	100	100 %	

IX. Learning Resources:

1- Required Textbook(s) (maximum two).

3. Gopal B. Saha. Fundementals of nuclear pharmacy, 2010, Springer.

2- Essential References.

1. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/TashfaZaheer/nuclear-pharmacy-part-1-125360708
2. https://slideplayer.com/slide/12189088/

XLIII. Course Policies:

157.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
158.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.

159.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
160.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
161.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
162.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

NUCLEAR PHARMACY

I. Course Identification and General Information:

1.	Course Title:	NUCLEAR PHARMACY			
2.	Course Code &Number:	PHR 515			
3.	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		2	-	-	**2**
4.	Study level/ semester at which this course is offered:	*(FIFTH) Year – (1st) semester*			
5.	Pre –requisite (if any):				
6.	Co –requisite (if any):				
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FACILITY			
10	Prepared by				
11	Date of Approval				

II. Course Description:

This course concerns with the study of radiopharmaceuticals. In the first part it introduces knowledge of radiations (in particular those used in medical/pharmaceutical purposes), types of radiations, elements that emit radiation, and production and labeling methods , risks management and dosing . The second part focus on radiopharmaceuticals used for diagnosis and treatment of human diseases.

يهتم هذا المقرر بدراسة الأدوية المشعة و يبدأ المقرر في الجزء الأول بمقدمة عامة عن الإشعاعات (خصوصا المستخدمة منها في المجال الطبي و الصيدلاني) و انواعها و العناصر التي تنبعث منها وطرق تصنيع الأدوية المشعة ، وإدارة مخاطرها ، وطرق تحديد جرعاتها ثم يركز الجزء الثاني من المقرر على أهم أنواع الأدوية المشعة المستخدمة في تشخيص و معالجة الأمراض البشرية

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Explain the physicochemical properties of radionuclides, radioisotopes , radioisomers and radiopharmaceuticals.
A4	Describe analytical methods, principles, design and development techniques	**a2.** Describe the analytical methods used for measurement of radioactivity , radiodiagnosis of human diseases and quality evaluation of radiopharmaceuticals.
A5	Identify actions of medicines on human body.	**a3**. Identify actions of radiations and radiopharmaceuticals in human.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the role of pharmacist in safe and effective radiopharmaceutical administration.
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify radiations, radionuclides and radiopharmaceuticals.
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b2 .**Apply calculations to measure radioactivity and radiopharmaceutical doses.
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1 .**Search efficiently for information using documented and electronic sources of information.
		c2. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		

D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate time management and self-learning skills.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge& understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the physicochemical properties of radionuclides, radioisotopes , radioisomers and radiopharmaceuticals.	**Active Lecture**	**Written exams**
a2. Describe the analytical methods used for measurement of radioactivity , radiodiagnosis of human diseases and quality evaluation of radiopharmaceuticals.		
a3. Identify actions of radiations and radiopharmaceuticals in human.		
a4. Describe the role of pharmacist in safe and effective radiopharmaceutical administration.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify radiations, radionuclides and radiopharmaceuticals.	**Active Lecture**	**Written exams**
b2 . Apply calculations to measure radioactivity and radiopharmaceutical doses.	**Active Lecture , feed-back learning**	**Written exams , Quizzes**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Search efficiently for information using documented and electronic sources of information.	**feed-back learning**	**Assignments**
c2. Present and report his/her works correctly using appropriate writing rules and technologies media.		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate time management and self-learning skills.	**feed-back learning**	**Assignments**

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction To Nuclear pharmacy**	a1, a2, a3, a4, b1, b2	• Definitions : nuclear medicine, nuclear pharmacy, , radiopharmaceuticals). • Regulations of nuclear pharmacy • Significance of nuclear pharmacy • Interior design and location of a nuclear pharmacy • The basics of atom radioactivity : atom nuclear structure, types of particles. • Radioactivity: lower, high energy, theories • Radionuclides, radioisotopes,	2	4

			radioisomers, normal atoms vs. radionuclides • Types of radiations : ionizing, non-ionizing. Differences and types • Ionizing radiations : Particle radiations (α, β), wave radiations (gamma radiations, X-rays) properties. • Risks of radiations: types of risks, factors affecting risks		
2	**Radioactivity**	a1, a2, a3, a4, b1, b2	• Radioactivity: types of radioactive substances (natural, artificial) • Properties of commonly used radionuclides • Units of measurement of radioactivity • Half-lives : physical, biological, effective • Kinetics of radioactivity • Calculation of radiation exposure • calculation of radiation absorbed by man • calculation of dose of radiopharmaceutical: dose as Ci or Bq, as µg as rad/mCi	3	6
3	**Introduction to Radiopharmaceuticals**	a1, a2, a3, a4, b1, b2	• Definition and components of radiopharmaceutical • Production and labeling • classification • properties of ideal radiopharmaceutical • Routes of administration • Administration procedures: dose calibrator	2	4
Mid-term exam				1	2

4	**Diagnostic radiopharmaceuticals**	a1, a2, a3, a4, b1, b2	**II. In vitro diagnostic methods** o Radioimmunoassay o Schilling test o Blood volume determination **III. In vivo (Imaging diagnostic radiopharmaceuticals):** (iii) **Gamma camera techniques:** scintillation, SPECT techniques , types , doses and adverse effects for o Heart imaging o Brain imaging o Kidney imaging o Thyroid and parathyroid imaging o Lung imaging o Bone and joint imaging o Liver imaging o Infection and inflammation imaging **(iv) Positron emission tomography (PET)** o Advantages o Disadvantages o Radionuclides and Radiopharmaceuticals used for imaging	4	8

5	**Therapeutic Radiopharmaceuticals**	a1, a2, a3, a4, b1, b2	• General properties of radiotherapeutics • Types , doses and adverse effects for Radiopharmaceuticals used for therapy of : o Hyperthyroidism o Thyroid cancer o Bone metastasis o Neuroendocrine digestive system tumor o Prostate cancer o Liver cancer o Non-Hodking lymphoma o Polycythemia and leukemia	2	4
6	**Quality control of radiopharmaceuticals**	a2, a4	• Physicochemical tests • Radioactive purity • Radiochemical purity • Chemical purity • Radioassay • Biological tests: sterility, apyrogenicity	1	
FINAL – EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	6 Units

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom. The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector
Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation
Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to provide a search-based report on one radiopharmaceutical product.	c1, c2, d1	4-13	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b2
		Assignments	7, 12	10	10	c1, c2, d1
2	Mid-semester exam (written exam)		7	20	20	a1, a2, a3, a4, b1, b2
3	Final exam of (written exam)		16	60	60	a1, a2, a3, a4, b1, b2
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Gopal B. Saha. Fundementals of nuclear pharmacy, 2010, Springer.

2- Essential References.

1. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/TashfaZaheer/nuclear-pharmacy-part-1-125360708
2. https://slideplayer.com/slide/12189088/

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

QUALITY CONTROL

Course Code (**PHR514**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XLIV. Course Identification and General Information:						
28	**Course Title:**	**QUALITY CONTROL**				
28	**Course Code &Number:**	**PHR514**				
28	**Credit hours:**	C.H			TOTAL	
		L.	P.	Tr.		
		2	1	-	**3**	
28	**Study level/ semester at which this course is offered:**	*(5TH) Year – (FIRST) semester*				
28	**Pre –requisite (if any):**	**None**				

28	**Co –requisite (if any):**	PHR513 (Industrial Pharmacy)
28	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**
28	**Language of teaching the course:**	**ENGLISH**
29	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**
29	**Prepared by**	
29	**Date of Approval**	

L: lecturing ;; P: practical ; T.: training

XLV. Course Description:

This course provides the students with the knowledge and ability to control the quality of drugs and other medical substances by the study of quality tests and knowledge of allowed limits in pharmacopeia. Also , this course deals with the study of the quality management, requirements, procedures as well as pharmacopeial tests to evaluate the quality of raw materials, in-process products and finished pharmaceutical products and QC tests of raw finished products , package and labels.

The practical part of the course provides with skills of quality control of drugs that done in pharmaceutical instrumental analysis and pharmaceutics lab.

يزود هذا المقرر الطلاب بالمعرفة والقدرة على معرفة جودة الأدوية والمواد الطبية الأخرى من خلال دراسة اختبارات الجودة والحدود المسموح بها في دساتير الأدوية. كما ، يتناول هذا المقرر دراسة إدارة الجودة والمتطلبات والإجراءات وكذلك الاختبارات الصيدلانية لتقييم جودة المواد الخام والمنتجات التي تكون قيد المعالجة والمنتجات الصيدلانية الجاهزة واختبارات مراقبة الجودة للمنتجات النهائية النهائية والعبوات والملصقات و .يوفر الجزء العملي من المقرر مهارات مراقبة جودة الأدوية ويتم ذلك في مختبر التحليل الآلي الصيدلاني ومختبر الصيدلانيات.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

60. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Identify the physicochemical properties of raw materials , in-process products and finished products that are used to evaluate their qualities.

A4	Describe analytical methods, principles, design and development techniques	**a2**. Explain the analytical methods and procedures applied to evaluate the quality of pharmaceutical raw materials , in-process products and finished products.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacists in implementing quality control rules and in evaluating the quality of pharmaceutical products.
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the out-coming data obtained after qualitative or quantitative analysis of raw materials , in-process products and finished pharmaceutical products
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b2.** Evaluate different types of pharmaceutical dosage forms.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b3 .** Select suitable standard operation procedures to investigate quality of pharmaceutical raw materials , in-process products and finished products
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b4 .**Apply calculations to assess the quality of raw materials , in-process products and finished pharmaceutical products
Professional and practical skills: upon completion of the course, students will be able to:		
C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.

D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

61. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the physicochemical properties of raw materials , in-process products and finished products that are used to evaluate their qualities.	**Active Lecture**	**written exams**
a2. Explain the analytical methods and procedures applied to evaluate the quality of pharmaceutical raw materials , in-process products and finished products.		
a3. Describe the role of pharmacists in implementing quality control rules and in evaluating the quality of pharmaceutical products.		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret the out-coming data obtained after qualitative or quantitative analysis of raw materials , in-process products	**Active Lecture, feed-back learning**	**Written exams , quizzes, assignment**

and finished pharmaceutical products		
b2. Evaluate different types of pharmaceutical dosage forms.		
b4 . Apply calculations to assess the quality of raw materials , in-process products and finished pharmaceutical products		
b3 . Select suitable standard operation procedures to investigate quality of pharmaceutical raw materials , in-process products and finished products	**Active Lecture, laboratory practice**	**Written exam , Lab. term works, final practical exam**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice**	**Lab. term works, final practical exam**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**laboratory practice, Feed-back learning**	**Lab. term works, final practical exam, Assignments**

VI. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to Quality control**	a1, a2, a3, b1, b2	• definition of quality, quality control QC, specifications (qualitative and quantitative) , governmental and drug plant QC lab, Relation and mission of quality management system (QMS), quality assurance (QA), GMP and QC • Pharmacopeias : the References	2	4

			of quality control : BP, USP: contents , volumes , understanding monographs		
2	**Units of QC lab**	a1, a2, a3, b1, b2	**missions of** a) Raw materials unit b) In-process unit c) Validation unit d) Microbiology unit e) Finished-product unit	1	2
3	**Procedures of QC**	a1, a2, a3, b1, b2	• sampling methods, number of samples based on batch size • Checking and calibration of equipments • Validation of results: accuracy, precision • Documenting and reporting • Quarantine, releasing and rejecting	2	4
4	**QC tests of raw materials**	a1, a2, a3, b1, b2, b4	**Tests of pharmacopeial specification of raw materials** identification, assay, microbial content, impurities content, other tests with examples from the pharmacopeia	2	4
			• MID-TERM EXAM • Post-exam discussion	1	2
5	**QC tests of raw In-process products**	a1, a2, a3, b1, b2, b4	Evaluation of specification of products resulting from unit-operations : drying, evaporation, filtration, milling, granulation, mixing	2	4
6	**QC tests of raw finished products , package and labels**	a1, a2, a3, b1, b2, b4	**specific Tests (pharmacopeial specification) finished products including :** • Solutions • Suspensions & emulsions • Semisolid products • Suppositories	4	

			• Powders • Granules • Tablets • Capsules • Sterile products : parenteral, ophthalmic preparations **Testing of pharmacopeial specifications of :** • Package Labels : information		8
Course Review		a1, a2, a3, b1, b2, b4	Review of the course topics by discussion session.	1	2
FINAL – EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	6 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
257.	QC sampling , checking of equipments & reporting	**1**	**2**	b3, c1, c2, d1, d2, d3
258.	QC of raw materials : paracetamol BP	**1**	**2**	b3, c1, c2, d1, d2, d3
259.	QC of in-process products after : mixing	**1**	**2**	b3, c1, c2, d1, d2, d3
260.	QC of in-process finished products : solution chlorpheniramine syrup BP	**1**	**2**	b3, c1, c2, d1, d2, d3
261.	QC of in-process finished products : suspension	**1**	**2**	b3, c1, c2, d1, d2, d3

	metronidazole suspension USP			
262.	QC of in-process finished products : creams miconazole cream BP	**1**	**2**	b3, c1, c2, d1, d2, d3
263.	QC of in-process finished products : suppositories paracetamol suppositories		**2**	b3, c1, c2, d1, d2, d3
264.	QC of in-process finished products : paracetamol tablet friability hardness	**1**	**2**	b3, c1, c2, d1, d2, d3
265.	QC of in-process finished products : paracetamol tablet (dissolution, disintegration)	**1**	**2**	b3, c1, c2, d1, d2, d3
266.	QC of in-process finished products : capsules amoxicillin capsules USP	**1**	**2**	b3, c1, c2, d1, d2, d3
267.	QC labels of labels & package	**1**	**2**	b3, c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	
Total		**12**	**24**	

VII. Teaching strategies of the course:

Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

VIII. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to solve the problems provided by the teacher at the end of each unit	b4, d2	7	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3
		Assignments	7, 12	5	5	b4, d2
2	Mid-semester exam (written		7	10	10	a1, a2, a3, b1, b2, b4

	exam)				
3	Final exam (written exam)	16	50	50	a1, a2, a3, b1, b2, b4
		TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b3, c1, c2, d1, d2, d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	b3, c1, c2, d1, d2, d3
			Total	30	30 %	

X. Learning Resources:

1- Required Textbook(s) (maximum two).

4. Marayya. Quality assurance and quality management in pharmaceutical industry
5. USP, 2020

2- Essential References.

1. BP, 2016
2. A. P. Kulkarni. Process instrumentation And control
3. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/PrashantTomar7/quality-control-59141900
2. https://slideplayer.com/slide/5199515/

XLIV. Course Policies:

163.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
164.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
165.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
166.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
167.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
168.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

QUALITY CONTROL

I. Course Identification and General Information:

1.	**Course Title:**	**QUALITY CONTROL**			
2.	**Course Code &Number:**	**PHR514**			
3.	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	**3**
4.	**Study level/ semester at which this course is offered:**	*(5TH) Year – (FIRST) semester*			
5.	**Pre –requisite (if any):**	**None**			
6.	**Co –requisite (if any):**	PHR513 (Industrial Pharmacy)			
7.	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
8.	**Language of teaching the course:**	**ENGLISH**			
9.	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**			
10	**Prepared by**				
11	**Date of Approval**				

L: lecturing ;; P: practical ; T.: training

II. Course Description:

This course provides the students with the knowledge and ability to control the quality of drugs and other medical substances by the study of quality tests and knowledge of allowed limits in pharmacopeia. Also , this course deals with the study of the quality management, requirements, procedures as well as pharmacopeial tests to evaluate the quality of raw materials, in-process products and finished pharmaceutical products and QC tests of raw finished products , package and labels.

The practical part of the course provides with skills of quality control of drugs that done in pharmaceutical instrumental analysis and pharmaceutics lab.

يزود هذا المقرر الطلاب بالمعرفة والقدرة على معرفة جودة الأدوية والمواد الطبية الأخرى من خلال دراسة اختبارات الجودة والحدود المسموح بها في دساتير الأدوية. كما ، يتناول هذا المقرر دراسة إدارة الجودة والمتطلبات والإجراءات وكذلك الاختبارات الصيدلانية لتقييم جودة المواد الخام والمنتجات التي تكون قيد المعالجة والمنتجات الصيدلانية الجاهزة واختبارات مراقبة الجودة للمنتجات النهائية النهائية والعبوات والملصقات و .يوفر الجزء العملي من المقرر مهارات مراقبة جودة الأدوية ويتم ذلك في مختبر التحليل الآلي الصيدلاني ومختبر الصيدلانيات.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A3	Explain physicochemical properties of materials and products	**a1.** Identify the physicochemical properties of raw materials , in-process products and finished products that are used to evaluate their qualities.
A4	Describe analytical methods, principles, design and development techniques	**a2**. Explain the analytical methods and procedures applied to evaluate the quality of pharmaceutical raw materials , in-process products and finished products.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of pharmacists in implementing quality control rules and in evaluating the quality of pharmaceutical products.
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret the out-coming data obtained after qualitative or quantitative analysis of raw materials , in-process products and finished pharmaceutical products
B3	Design an evaluate different types of safe and effective drugs , pharmaceutical dosage forms and cosmetic preparations	**b2.** Evaluate different types of pharmaceutical dosage forms.
B4	Select appropriate standard operation procedures to conduct qualitative and quantitative analysis.	**b3 .** Select suitable standard operation procedures to investigate quality of pharmaceutical raw materials , in-process products and finished products
B9	Apply mathematical equations to calculate data relevant to pharmacy practices.	**b4 .**Apply calculations to assess the quality of raw materials , in-process products and finished pharmaceutical products
Professional and practical skills: upon completion of the course, students will be able to:		

C1	Handle safely the chemicals, biological samples and pharmaceutical ingredients and products.	**c1.** Handle efficiently and safely the chemical materials and tools used in the laboratory
C2	Operate different instruments and use emerge technologies for preformulation, formulation and analysis of materials according to standard guidelines.	**c2.** Operate the instruments and perform experiments successfully in the laboratory
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Communicate effectively and behave in discipline with colleagues.
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate the skills of time management and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3.** Participate efficiently with his colleagues in a team work.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Identify the physicochemical properties of raw materials , in-process products and finished products that are used to evaluate their qualities.	**Active Lecture**	**written exams**
a2. Explain the analytical methods and procedures applied to evaluate the quality of pharmaceutical raw materials , in-process products and finished products.		

a3. Describe the role of pharmacists in implementing quality control rules and in evaluating the quality of pharmaceutical products.		
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret the out-coming data obtained after qualitative or quantitative analysis of raw materials , in-process products and finished pharmaceutical products	**Active Lecture, feed-back learning**	**Written exams , quizzes, assignment**
b2. Evaluate different types of pharmaceutical dosage forms.		
b4 . Apply calculations to assess the quality of raw materials , in-process products and finished pharmaceutical products		
b3 . Select suitable standard operation procedures to investigate quality of pharmaceutical raw materials , in-process products and finished products	**Active Lecture, laboratory practice**	**Written exam , Lab. term works, final practical exam**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory	**laboratory practice**	**Lab. term works, final practical exam**
c2. Operate the instruments and perform experiments successfully in the laboratory		

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues.	**laboratory practice**	**Lab. term works, final practical exam**
d3. Participate efficiently with his colleagues in a team work.		
d2. Demonstrate the skills of time management and self-learning.	**laboratory practice, Feed-back learning**	**Lab. term works, final practical exam, Assignments**

IV. Course Content:

A – Theoretical Aspect:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to Quality control**	a1, a2, a3, b1, b2	• definition of quality, quality control QC, specifications (qualitative and quantitative) , governmental and drug plant QC lab, Relation and mission of quality management system (QMS), quality assurance (QA), GMP and QC • Pharmacopeias : the References of quality control : BP, USP: contents , volumes , understanding monographs	2	4
2	**Units of QC lab**	a1, a2, a3, b1, b2	**missions of** a) Raw materials unit b) In-process unit c) Validation unit d) Microbiology unit e) Finished-product unit	1	2
3	**Procedures of QC**	a1, a2, a3, b1, b2	• sampling methods, number of samples based on batch size • Checking and calibration of equipments • Validation of results: accuracy, precision • Documenting and reporting • Quarantine, releasing and rejecting	2	4
4	**QC tests of raw materials**	a1, a2, a3, b1, b2, b4	**Tests of pharmacopeial specification of raw materials** identification, assay, microbial content, impurities content, other tests with examples from the pharmacopeia	2	4

			• MID-TERM EXAM • Post-exam discussion	1	2
5	**QC tests of raw In-process products**	a1, a2, a3, b1, b2, b4	Evaluation of specification of products resulting from unit-operations : drying, evaporation, filtration, milling, granulation, mixing	2	4
6	**QC tests of raw finished products , package and labels**	a1, a2, a3, b1, b2, b4	**specific Tests (pharmacopeial specification) finished products including :** • Solutions • Suspensions & emulsions • Semisolid products • Suppositories • Powders • Granules • Tablets • Capsules • Sterile products : parenteral, ophthalmic preparations **Testing of pharmacopeial specifications of :** • Package Labels : information	4	8
Course Review		a1, a2, a3, b1, b2, b4	Review of the course topics by discussion session.	1	2
FINAL – EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	6 Units

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	QC sampling , checking of equipments & reporting	**1**	**2**	b3, c1, c2, d1, d2, d3
2.	QC of raw materials : paracetamol BP	**1**	**2**	b3, c1, c2, d1, d2, d3
3.	QC of in-process products after : mixing	**1**	**2**	b3, c1, c2, d1, d2, d3
4.	QC of in-process finished products : solution chlorpheniramine syrup BP	**1**	**2**	b3, c1, c2, d1, d2, d3
5.	QC of in-process finished products : suspension metronidazole suspension USP	**1**	**2**	b3, c1, c2, d1, d2, d3
6.	QC of in-process finished products : creams miconazole cream BP	**1**	**2**	b3, c1, c2, d1, d2, d3
7.	QC of in-process finished products : suppositories paracetamol suppositories		**2**	b3, c1, c2, d1, d2, d3
8.	QC of in-process finished products : paracetamol tablet friability hardness	**1**	**2**	b3, c1, c2, d1, d2, d3
9.	QC of in-process finished products : paracetamol tablet (dissolution, disintegration)	**1**	**2**	b3, c1, c2, d1, d2, d3
10.	QC of in-process finished products : capsules amoxicillin capsules USP	**1**	**2**	b3, c1, c2, d1, d2, d3
11.	QC labels of labels & package	**1**	**2**	b3, c1, c2, d1, d2, d3
PRACTICAL EXAM		**1**	**2**	
Total		**12**	**24**	

V. Teaching strategies of the course:

Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Laboratory practice: students doing experiments in labs individually or in small groups

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

IX. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: every student is assigned to solve the problems provided by the teacher at the end of each unit	b4, d2	7	

VII. Schedule of Assessment Tasks for Students During the Semester

Theoretical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	5	5	b1, b2, b3
		Assignments	7, 12	5	5	b4, d2
2	Mid-semester exam (written exam)		7	10	10	a1, a2, a3, b1, b2, b4
3	Final exam (written exam)		16	50	50	a1, a2, a3, b1, b2, b4
			TOTAL	70	70 %	70

Practical part assessment

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes(CILOs)
1	Lab. Term works	Attitude	1-12	5	5	b3, c1, c2, d1, d2, d3
2		Accomplishments		5	5	
	Final exam (practical)		12	20	20	b3, c1, c2, d1, d2, d3
			Total	30	30 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Marayya. Quality assurance and quality management in pharmaceutical industry
2. USP, 2020

2- Essential References.

1. BP, 2016
2. A. P. Kulkarni. Process instrumentation And control
3. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/PrashantTomar7/quality-control-59141900
2. https://slideplayer.com/slide/5199515/

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

RESEARCH METHODOLOGY

Course Code (**FMS511**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

XLVI. Course Identification and General Information:

29	**Course Title:**	**RESEARCH METHODOOLOGY**			
29	**Course Code &Number:**	FMS511			
29	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		1	-	-	**1**
29	**Study level/ semester at which this course is offered:**	*(Fifth) Year – (1ST) semester*			
29	**Pre –requisite (if any):**	-			
29	**Co –requisite (if any):**	-			
29	**Program (s) in which the course is offered:**	**All Bachelor programs offered by the faculty**			
30	**Language of teaching the course:**	**ENGLISH**			
30	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**			
30	**Prepared by**				
30	**Date of Approval**				

L: lecturing ; P: practical ; Tr.: training

XLVII. Course Description:

This course provides the students with the knowledge of research methodology, research proposal, components of a research or a thesis, and provides students with skills how to carry out , write and present research work scientifically and effectively, publishing of thesis/ research paper and selection of the suitable place of publishing thesis/ research paper.

يزود هذا المساق الطلاب بمعرفة منهجية البحث ، واقتراح البحث ، ومكونات البحث أو الأطروحة ، ويزود الطلاب بالمهارات المتعلقة بكيفية تنفيذ وكتابة وتقديم العمل البحثي بشكل علمي وفعال ، ونشر الأطروحة / ورقة البحث والاختيار المكان المناسب لنشر الأطروحة / ورقة البحث.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

62. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1**. Discuss the components of a thesis or a research including introduction, methods, results, discussion, conclusions, recommendations
		a2. Identify the procedures and methods of writing a thesis and publishing a research paper.
		a3. Determine the types of references and how to write them on a research paper or thesis.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the role of pharmacists to carry out , write and present research using scientific rules
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify different types of research and data collection tools.
B8	Use appropriate research methods including experimental, observational and electronic to collect data and solve problems.	**b2.** Use appropriate research method to solve problems
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1 .**Conduct research studies using scientific methodology
Transferable skills: upon completion of the course, students will be able to:		
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d1.** Demonstrate skill of time management and self-learning

63. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Discuss the components of a thesis or a research including introduction, methods, results, discussion, conclusions, recommendations	**Active Lecture**	**Written exams**
a2. Identify the procedures and methods of writing a thesis and publishing a research paper.		
a3. Determine the types of references and how to write them on a research paper or thesis.		
a4. Describe the role of pharmacists to carry out , write and present research using scientific rules		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify different types of research and data collection tools.	**Active Lecture**	**Written exam**
b2. Use appropriate research method to solve problems	**Active Lecture, feed-back learning**	**Written exam, quizzes**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Conduct research studies using scientific methodology	**Feed-back learning**	**Assignment**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching

Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate skill of time management and self-learning	**Feed-back learning**	**Assignments**

VII. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to research methodology**	a1, a2, a3, a4, b1, b2	• Definition : research, search, thesis, report, abstracts • Types of research and categories of methodologies : observational, experimental • Data collection tools: experiments, questionnaire, interview, etc	1	2
2	**Research Proposal**	a3, a5, d2	• Definition, objectives • Components of a proposal • Skills of writing a proposal • Examples of proposal templates • Training on writing a proposal	2	4
3	**Components of a research or a thesis**	a1, a2, a3, a4, b1, b2	Characteristics, academic requirements and details of a thesis/ research project: • Titles • Dedication • Acknowledgment • Contents table • Table of Lists of Abbreviations and symbols • Lists of tables and figures • Abstract • Scope of the work and Objectives • Introduction • materials and methods o Materials o Instrumentations	5	10

			○ Methods ○ Experimental studies ○ Clinical studies (study Population/sample/Sampling technique, Sample size, Variables definition ○ Data analysis • Results : presentation of tables and figures • Discussion • Conclusions • Recommendations • References • Appendices • Arabic abstract		
	• MID-TERM EXAM			1	2
4	**Thesis/ research paper for publishing**	a1, a2, a3, a4, b1, b2	• How to write a thesis **paper**, title, abstract, experimental, results & discussion, references, • Publishing of articles and preparation of reports	2	4
5	**Preparation and skills of Presentation**	a1, a2, a3, a4, b1, b2	• Components of a presentation • Electronic presentation (power point slides) • Characteristics of font, color, background of slides • Presentation skills ○ Voice intonation ○ Standing /sitting presentation ○ Commenting on slides contents	3	6
Course Review		a1, a2, a3, a4, b1, b2	Review of the course topics by discussion session.	1	2

FINAL – EXAM	1	2
TOTAL	16	32

VIII. Teaching strategies of the course:

Active lecture: It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

Seminars: these are mainly used with small groups of students (20-30) students in which they find better chances for discussing and participating in the teaching process.

X. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to prepare a scientific article on topics selected by the teacher.	c1, d1	4-13	6

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b2
		Assignments	7, 12	10	10	c1, d1
2	Mid-semester exam (written		7	20	20	a1, a2, a3, a4, b1, b2

	exam)				
3	Final exam of (written exam)	16	60	60	a1, a2, a3, a4, b1, b2
		TOTAL	100	100 %	

XI. Learning Resources:

1- Required Textbook(s) (ma4imum two).

C. R. Kothari. Research methodology

2- Essential References.

Handbook of Research Methodology

3- Electronic Materials and Web Sites *etc*.

https://www.slideshare.net/onlyuforu3/research-methodology-part-i
https://www.slideshare.net/rijalcpr/research-methodology-23101947

XLV. Course Policies:

169.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
170.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
171.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
172.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
173.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
174.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

RESEARCH METHODOLOGY

I. Course Identification and General Information:

1.	**Course Title:**	**RESEARCH METHODOOLOGY**				
2.	**Course Code &Number:**	FMS511				
3.	**Credit hours:**	C.H				TOTAL
		L.			P.	Tr.
			1	-	-	-	**1**
4.	**Study level/ semester at which this course is offered:**	*(Fifth) Year – (1ST) semester*				
5.	**Pre –requisite (if any):**	-				
6.	**Co –requisite (if any):**	-				
7.	**Program (s) in which the course is offered:**	**All Bachelor programs offered by the faculty**				
8.	**Language of teaching the course:**	**ENGLISH**				
9.	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**				
10	**Prepared by**					
11	**Date of Approval**					

II. Course Description:

This course provides the students with the knowledge of research methodology, research proposal, components of a research or a thesis, and provides students with skills how to carry out , write and present research work scientifically and effectively, publishing of thesis/ research paper and selection of the suitable place of publishing thesis/ research paper.

يزود هذا المساق الطلاب بمعرفة منهجية البحث ، واقتراح البحث ، ومكونات البحث أو الأطروحة ، ويزود الطلاب بالمهارات المتعلقة بكيفية تنفيذ وكتابة وتقديم العمل البحثي بشكل علمي وفعال ، ونشر الأطروحة / ورقة البحث والاختيار المكان المناسب لنشر الأطروحة / ورقة البحث.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A1	Show understanding of fundamentals of biomedical sciences, physics, mathematics and chemistry and organization of human body.	**a1**. Discuss the components of a thesis or a research including introduction, methods, results, discussion, conclusions, recommendations
		a2. Identify the procedures and methods of writing a thesis and publishing a research paper.
		a3. Determine the types of references and how to write them on a research paper or thesis.
A10	Describe the pharmacists role in different pharmacy practices.	**a4.** Describe the role of pharmacists to carry out , write and present research using scientific rules
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify different types of research and data collection tools.
B8	Use appropriate research methods including experimental, observational and electronic to collect data and solve problems.	**b2.** Use appropriate research method to solve problems
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1 .**Conduct research studies using scientific methodology
Transferable skills: upon completion of the course, students will be able to:		
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d1.** Demonstrate skill of time management and self-learning

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Discuss the components of a thesis or a research including introduction, methods, results, discussion, conclusions, recommendations	**Active Lecture**	**Written exams**
a2. Identify the procedures and methods of writing a thesis and publishing a research paper.		
a3. Determine the types of references and how to write them on a research paper or thesis.		
a4. Describe the role of pharmacists to carry out , write and present research using scientific rules		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify different types of research and data collection tools.	**Active Lecture**	**Written exam**
b2. Use appropriate research method to solve problems	**Active Lecture, feed-back learning**	**Written exam, quizzes**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 . Conduct research studies using scientific methodology	**Feed-back learning**	**Assignment**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching

Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate skill of time management and self-learning	**Feed-back learning**	**Assignments**

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to research methodology**	a1, a2, a3, a4, b1, b2	• Definition : research, search, thesis, report, abstracts • Types of research and categories of methodologies : observational, experimental • Data collection tools: experiments, questionnaire, interview, etc	1	2
2	**Research Proposal**	a3, a5, d2	• Definition, objectives • Components of a proposal • Skills of writing a proposal • Examples of proposal templates • Training on writing a proposal	2	4
3	**Components of a research or a thesis**	a1, a2, a3, a4, b1, b2	Characteristics, academic requirements and details of a thesis/ research project: • Titles • Dedication • Acknowledgment • Contents table • Table of Lists of Abbreviations and symbols • Lists of tables and figures • Abstract • Scope of the work and Objectives • Introduction • materials and methods o Materials o Instrumentations	5	10

			○ Methods ○ Experimental studies ○ Clinical studies (study Population/sample/Sampling technique, Sample size, Variables definition ○ Data analysis • Results : presentation of tables and figures • Discussion • Conclusions • Recommendations • References • Appendices • Arabic abstract		
	• MID-TERM EXAM			1	2
4	**Thesis/ research paper for publishing**	a1, a2, a3, a4, b1, b2	• How to write a thesis **paper**, title, abstract, experimental, results & discussion, references, • Publishing of articles and preparation of reports	2	4
5	**Preparation and skills of Presentation**	a1, a2, a3, a4, b1, b2	• Components of a presentation • Electronic presentation (power point slides) • Characteristics of font, color, background of slides • Presentation skills ○ Voice intonation ○ Standing /sitting presentation ○ Commenting on slides contents	3	6
Course Review		a1, a2, a3, a4, b1, b2	Review of the course topics by discussion session.	1	2

FINAL – EXAM	1	2
TOTAL	16	32

V. Teaching strategies of the course:

Active lecture: It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by usingtechniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homeworks, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

Seminars: these are mainly used with small groups of students (20-30) students in which they find better chances for discussing and participating in the teaching process.

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to prepare a scientific article on topics selected by the teacher.	c1, d1	4-13	6

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion to Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b2
		Assignments	7, 12	10	10	c1, d1

2	Mid-semester exam (written exam)		7	20	20	a1, a2, a3, a4, b1, b2
3	Final exam of (written exam)		16	60	60	a1, a2, a3, a4, b1, b2
			TOTAL	100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

C. R. Kothari. Research methodology.

2- Essential References.

Handbook of Research Methodology

3- Electronic Materials and Web Sites *etc*.

https://www.slideshare.net/onlyuforu3/research-methodology-part-i
https://www.slideshare.net/rijalcpr/research-methodology-23101947

IX. Course Policies:

175.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
176.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
177.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
178.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Course Specification

APPLIED PHARMACOGNOSY II

XLVIII. Course Identification and General Information:

30	**Course Title:**	**APPLIED PHARMACOGNOSY II**					
30	**Course Code &Number:**	**PHR524**					
30	**Credit hours:**	C.H					TOTAL
		Theoretical			P.	Tr.	
		L.	Tut.	S.			
		2	-	-	1	-	**3**
30	**Study level/ semester at which this course is offered:**	*(FIFTH) Year – (2ND) semester*					
30	**Pre –requisite (if any):**	• **GENERAL Pharmacognosy I & II** • **Pharmacology & therapeutics I & II , III & IV**					
30	**Co –requisite (if any):**	**NONE**					
31	**Program (s) in which the course is offered:**	**All BC programs offered by the university**					
31	**Language of teaching the course:**	**ENGLISH**					
31	**Location of teaching the course:**	**IN THE UNIVERSITY**					
31	**Prepared By:**						
31	**Date of Approval**						

L: lecturing ; Tut: Tutorial , S: seminar ; P: practical ; Tr.: training

XLIX. Course Description:

The course deals with the study of methods of complementary and alternative herbal medicine.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

64. Alignment CILOs to PILOs

No.	PILOs	CILOs
57.	A1	**a1.** Identify the diseases/ disorders of the body which can be treated by complementary and alternative medicine including traditional herbal therapies i& evidence-based phytotherapy
58.	A2	**a2.** Explain the biological effects of phytotherapy on body systems.
59.	A3	**a3**. Discuss the principles of complementary and alternative medicine including traditional herbal therapies i& evidence-based phytotherapy.
60.		**a4**. Recognize the concepts of traditional medicine, integrated medicine & Pharmacovigilance in complementary and alternative medicine.
61.	A4	**a5.** Comprehend his/her role as a pharmacist in employing and assessing benefits and risks of complementary and alternative medicine
62.	B2	**b1 .**Classify different types of traditional & phytotherapeutical complementary and alternative medicine
63.		**b2.** Compare different methods applied in complementary and alternative herbal medicine based on benefits and risks.
64.	B3	**b3.** Predict the adverse effects of techniques applied in complementary and alternative medicine
65.	B4	**b4 .** Assess the benefit/risks of techniques applied in complementary and alternative herbal medicine
66.		**b5.** Select an appropriate non-classical therapeutic method for patients**.**
67.	C2	**c1.** Provide correct information on techniques applied in complementary and alternative medicine to patients and physicians.
68.	C4	**c2 .**Search efficiently for information using documented and electronic sources of information.
69.		**c3.** Present and report his/her works correctly using appropriate writing rules and technologies media.

70.	**D1**	**d1.** Work successfully in team-activities.
71.	**D2**	**d2.** Show respect to life.
72.	**D3**	**d3.** Communicate effectively and cooperate with colleagues.
73.	**D4**	**d4.** Demonstrate the ability of time management and self-learning.

65. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1, a2, a3, a4, a5	Lecture	Written exam , Attendance

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1, b2 , b3 , b4, b5	Lecture, feed-back learning	Written exam , Attendance , quizzes , assignments

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1	Lecture	Written exam , Attendance
c2 , c3	feed-back learning, Group-project	Assignments

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1, d3	Feed-back learning	Assignments
d2	Lecture	Written exam , Attendance
d4	Feed-back learning	Assignments

VIII. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a2, a3, a4, a5, b1, b2, d2	The complementary and alternative concept of healthcare Comparison with classical methods of therapy (Benefits/risk ; evidence/non-evidence based) The principles of complementary and alternative herbal medicine alternative medicine into practice Delivering complementary and Complementary and alternative herbal medicine Pharmacovigilance of complementary herbal medicines	2	4
2	**Traditional herbal therapies**	a1, a2, a3, a4, a5, c1, d2	The traditional healthcare environment and references Concepts , principles and applications of • Traditional Chinese medicine • Indian Ayurveda medicine • Traditional medicine in Yemen	2	4
3	**evidence-based herbal medicine**	a1, a2, a3, a4, a5, b1, b2, b3, b4, b5, c1, d2	Principles , applications , benefit/risks of : 9- Homeopathy and anthroposophy 10- Aromatherapy 11- Flower remedy therapy 12- phytotherapy	2	4

			• MID-TERM EXAM • Post-exam discussion	1	2
4	**Products of phytotherapy**	a1, a2, a5, b3, b4, b5, c1, d2	**Topical products** : demulcents, antiinflammtories, antiseptic disinfectants, treatment of burn and wounds. **Oral products :** recommended herbals or herbal combinations , their doses and preparations for treatment of • Respiratory diseases (common cold, asthma, cough) • GIT disorders (diarrhea, constipation, peptic ulcer, intestinal colic) • Renal disorders: stones, real colic • CVS disorders: hypertension, angina • Endocrinology disorders: diabetes mellitus • Pain and inflammation • Hepatic dysfunction • Bacterial infections • Fungal infections • Parasital infections: malaria, helminthes • Erectile dysfunction • Amenorrhea • Infertility • Mental disorders: depression and psychosis	7	14
Course Review		a1, a2, a3, a4, a5, b1, b2, b3, b4, b5, c1, d2	Review of the course topics by discussion session.	1	2

FINAL - EXAM	1	2
TOTAL	16	32
Number of Weeks /and Units Per Semester	16 weeks	5 Units

IX. Teaching strategies of the course:

Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XVI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark
1	**Individual**: every student is assigned to do a search-report on benefit/risks of complementary & alternative herbal therapies studied in this course	b2, b4, c2, c3, d4	4-13	6
2	**Group** : each group of students will be assigned to do compare the benefit/risks of a groups of complementary & alternative herbal therapies comparison to classical drug therapy.	b2, b4, c2, c3, d1, ,d3, d4	14	4

X. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method	Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Attendance	1 - 15	5	5	a1, a2, a3, a4, a5, b1, b2, b3, b4, b5, c1, d2
2	Assignments (1 + 2)	4, 14	10	10	b2, b4, c2, c3, d1, ,d3, d4
3	Quiz 1 + Quiz 2	7, 12	5	5	b2, b4, b5
4	Mid-semester exam of theoretical part (written exam)	7	20	20	a1, a2, a3, a4, a5, b1, b2, b3, b4, b5, c1, d2
5	Final exam of theoretical part (written exam)	17	60	60	a1, a2, a3, a4, a5, b1, b2, b3, b4, b5, c1, d2
TOTAL			100	100 %	100

XII. Learning Resources:

1- Required Textbook(s) (maximum two).

6. Steven B Kayne. Complementary and alternative medicine,2009, Pharmaceutical press.
7. Karin Kraft. Pocket guide to herbal medicine, 2004 Georg Thieme Verlag

2- Essential References.

1. Joshi. Essentials of orthopaedics and applied physiotherapy
2. Sanjay Pandya. Practical Guidelines on Fluid Therapy
3. Basanta kumar Nanda. Electrotherapy simplified

3- Electronic Materials and Web Sites *etc*.

www.en.*wikipedia.org/*

XLVI. Course Policies:	
179.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
180.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
181.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
182.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Course Plan (Syllabus) of
APPLIED PHARMACOGNOSY II

II. Course Description:

The course deals with the study of methods of complementary and alternative herbal medicine.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

No.	PILOs	CILOs
1.	A1	**a1.** Identify the diseases/ disorders of the body which can be treated by complementary and alternative medicine including traditional herbal therapies i& evidence-based phytotherapy
2.	A2	**a2.** Explain the biological effects of phytotherapy on body systems.
3.	A3	**a3**. Discuss the principles of complementary and alternative medicine including traditional herbal therapies i& evidence-based phytotherapy.
4.		**a4**. Recognize the concepts of traditional medicine, integrated medicine & Pharmacovigilance in complementary and alternative medicine.
5.	A4	**a5.** Comprehend his/her role as a pharmacist in employing and assessing benefits and risks of complementary and alternative medicine
6.	B2	**b1 .**Classify different types of traditional & phytotherapeutical complementary and alternative medicine
7.		**b2.** Compare different methods applied in complementary and alternative herbal medicine based on benefits and risks.
8.	B3	**b3.** Predict the adverse effects of techniques applied in complementary and alternative medicine
9.	B4	**b4 .** Assess the benefit/risks of techniques applied in complementary and alternative herbal medicine
10.		**b5.** Select an appropriate non-classical therapeutic method for patients**.**
11.	C2	**c1.** Provide correct information on techniques applied in complementary and alternative medicine to patients and physicians.
12.	C4	**c2 .**Search efficiently for information using documented and electronic sources of information.
13.		**c3.** Present and report his/her works correctly using appropriate writing rules and technologies media.
14.	D1	**d1.** Work successfully in team-activities.
15.	D2	**d2.** Show respect to life.
16.	D3	**d3.** Communicate effectively and cooperate with colleagues.

17.	D4	**d4.** Demonstrate the ability of time management and self-learning.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1, a2, a3, a4, a5	Lecture	Written exam , Attendance

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1, b2 , b3 , b4, b5	Lecture, feed-back learning	Written exam , Attendance , quizzes , assignments

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1	Lecture	Written exam , Attendance
c2 , c3	feed-back learning, Group-project	Assignments

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1, d3	Feed-back learning	Assignments
d2	Lecture	Written exam , Attendance
d4	Feed-back learning	Assignments

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a2, a3, a4, a5, b1, b2, d2	The complementary and alternative concept of healthcare Comparison with classical methods of therapy (Benefits/risk ; evidence/non-evidence based) The principles of complementary and alternative herbal medicine alternative medicine into practice Delivering complementary and Complementary and alternative herbal medicine Pharmacovigilance of complementary herbal medicines	2	4
2	**Traditional herbal therapies**	a1, a2, a3, a4, a5, c1, d2	The traditional healthcare environment and references Concepts , principles and applications of • Traditional Chinese medicine • Indian Ayurveda medicine • Traditional medicine in Yemen	2	4
3	**evidence-based herbal medicine**	a1, a2, a3, a4, a5, b1, b2, b3, b4,	Principles , applications , benefit/risks of : 13- Homeopathy and anthroposophy	2	

		b5, c1, d2	14- Aromatherapy 15- Flower remedy therapy 16- phytotherapy		4
			• MID-TERM EXAM • Post-exam discussion	1	2
4	**Products of phytotherapy**	a1, a2, a5, b3, b4, b5, c1, d2	**Topical products** : demulcents, antiinflammtories, antiseptic disinfectants, treatment of burn and wounds. **Oral products :** recommended herbals or herbal combinations , their doses and preparations for treatment of • Respiratory diseases (common cold, asthma, cough) • GIT disorders (diarrhea, constipation, peptic ulcer, intestinal colic) • Renal disorders: stones, real colic • CVS disorders: hypertension, angina • Endocrinology disorders: diabetes mellitus • Pain and inflammation • Hepatic dysfunction • Bacterial infections • Fungal infections • Parasital infections: malaria, helminthes • Erectile dysfunction • Amenorrhea • Infertility • Mental disorders: depression and psychosis	7	14

Course Review	a1, a2, a3, a4, a5, b1, b2, b3, b4, b5, c1, d2	Review of the course topics by discussion session.	1	2
FINAL - EXAM			1	2
TOTAL			16	32
Number of Weeks /and Units Per Semester			16 weeks	5 Units

V. Teaching strategies of the course:

Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	Mark

1	**Individual**: every student is assigned to do a search-report on benefit/risks of complementary & alternative herbal therapies studied in this course	b2, b4, c2, c3, d4	4-13	6
2	**Group** : each group of students will be assigned to do compare the benefit/risks of a groups of complementary & alternative herbal therapies comparison to classical drug therapy.	b2, b4, c2, c3, d1, ,d3, d4	14	4

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method	Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Attendance	1 - 15	5	5	a1, a2, a3, a4, a5, b1, b2, b3, b4, b5, c1, d2
2	Assignments (1 + 2)	4, 14	10	10	b2, b4, c2, c3, d1, ,d3, d4
3	Quiz 1 + Quiz 2	7, 12	5	5	b2, b4, b5
4	Mid-semester exam of theoretical part (written exam)	7	20	20	a1, a2, a3, a4, a5, b1, b2, b3, b4, b5, c1, d2
5	Final exam of theoretical part (written exam)	17	60	60	a1, a2, a3, a4, a5, b1, b2, b3, b4, b5, c1, d2
TOTAL			100	100 %	100

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Steven B Kayne. Complementary and alternative medicine,2009, Pharmaceutical press.
2. Karin Kraft. Pocket guide to herbal medicine, 2004 Georg Thieme Verlag

2- Essential References.

1. Joshi. Essentials of orthopaedics and applied physiotherapy
2. Sanjay Pandya. Practical Guidelines on Fluid Therapy
3. Basanta kumar Nanda. Electrotherapy simplified

3- Electronic Materials and Web Sites *etc*.

www.en.*wikipedia.org/*

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecturewill not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

CLINCAL PHARMACY II

Course Code (**PHR522**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

L. Course Identification and General Information:

31	**Course Title:**	**CLINICAL PHARMACY II**			
31	**Course Code &Number:**	**PHR522**			
31	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	**3**
31	**Study level/ semester at which this course is offered:**	*(5TH) Year – (2nd) semester*			
31	**Pre –requisite (if any):**	**PHR512 (Clinical pharmacy I)**			
32	**Co –requisite (if any):**	**None**			
32	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
32	**Language of teaching the course:**	**ENGLISH**			
32	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**			
32	**Prepared by**				
32	**Date of Approval**	**2020**			

L: lecturing ; P: practical ; T.: training

LI. Course Description:

This course is complementary to (clinical pharmacy I) course and both are designed to provide the students with essential knowledge and skills of Assessment of drug therapy (drug therapy monitoring DTM) necessary to select appropriate safe and effective medications for patient`s cases. The course concerns in particular with drug therapy monitoring and also with clinical management and pharmacotherapy of patients having CVS, endocrinal disorders, respiratory, renal, infectious and oncologic disorders.

هذه المقرر التعليمي مكمل للمقرر السابق (الصيدلة السريرية1) وكلاهما مصمم لتزويد الطلاب بالمعرفة والمهارات الأساسية لتقييم العلاج الدوائي (مراقبة العلاج الدوائي DTM) اللازمة لاختيار الأدوية المناسبة والآمنة والفعالة لحالات المريض. يهتم المقرر الدراسي بشكل خاص بمراقبة العلاج الدوائي وكذلك بالإدارة السريرية والعلاج

الدوائي للمرضى الذين يعانون من أمراض القلب والشريين واضطرابات الغدد الصماء واضطرابات الجهاز التنفسي والكلى والمعدية والأورام.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

66. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A2	Explain the fundamental of social and behavioral sciences.	**a1**. Explain the impact of good behavior and communication of al clinical pharmacists on their relationship with patients and other healthcare professionals
A5	Identify actions of medicines on human body.	**a2**. Identify the therapeutic uses of medicines, their adverse effects and non-pharmacotherapy measures to aid cure of diseases.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of clinical pharmacists in rational medications use and designing therapeutic regimens for patients
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret clinical features and other disease data to properly recommend safe and effective medications for patients
B7	Formulate and evaluate patient care plan about rational drug use of medications.	**b2.** Formulate and evaluate patient care plan about ration medication use to improve patient safety and drug efficacy
Professional and practical skills: upon completion of the course, students will be able to:		
C4	Advice patients and healthcare professionals to optimize medicines use.	**c1.** Advise patient and healthcare professionals to optimize medicinal uses.
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c2 .** Search efficiently for information using evidence-based sources.

		c3. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the skills of time management, decision -making and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d2.** Participate effectively with his/her colleagues in a team work
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d3.** Take responsibility for adaption to change needs in clinical pharmacy practice
D5	Retrieve essential references of evidence-based to achieve maximal clinical effectiveness.	**d4.** Retrieve essential references of evidence-based practice to achieve maximum clinical effectiveness.

67. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the impact of good behavior and communication of al clinical pharmacists on their relationship with patients and other healthcare professionals	**Active Lecture**	**Written exams**
a2. Identify the therapeutic uses of medicines, their adverse effects and non-pharmacotherapy measures to aid cure of diseases.		
a3. Describe the role of clinical pharmacists in rational medications use and designing therapeutic regimens for patients		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies

b1. Interpret clinical features and other disease data to properly recommend safe and effective medications for patients	**Active Lecture, feed-back learning, seminar**	**Written exams , quizzes, seminar assessment**
b2. Formulate and evaluate patient care plan about ration medication use to improve patient safety and drug efficacy		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Advise patient and healthcare professionals to optimize medicinal uses.	**Seminar**	**seminar assessment**
c3. Present and report his/her works correctly using appropriate writing rules and technologies media.		
c2 . Search efficiently for information using evidence-based sources.	**Seminar**	**seminar assessment**
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the skills of time management, decision -making and self-learning.	**Seminar**	**seminar assessment**
d2. Participate effectively with his/her colleagues in a team work		
d3. Take responsibility for adaption to change needs in clinical pharmacy practice		
d4. Retrieve essential references of evidence-based practice to achieve maximum clinical effectiveness.		

V. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**skills of Assessment of drug therapy(drug therapy monitoring DTM)**	a1, a2, a3, a4, c1	• Objectives • patients need DTM • Drugs require DTM • Steps and methods of DTM • Examples of solved case studies	1	2
2	**Clinical management and pharmacotherapy :** Definition, types, pathogenesis, diagnosis and differentiation, pharmacotherapy (types of drugs, drug selection and algorithm) , non-pharmacotherapy measures				
a.	**CVS disorders**	a1, a2, a3, a4, c1	• Hypertension • Angina & Myocardial infarction	2	4
b.	**Endocrinal disorders**	a1, a2, a3, a4, c1	• Diabetes mellitus • Thyroid disorders	2	4
c.	**Seminar**	c1, c2 c3, d1, d2, d3, d4	Seminar to discuss and solve clinical case studies.	1	
	mid-term exam			1	2
d.	**Respiratory disorders**	a1, a2, a3, a4, c1	• Bronchial asthma • Chronic Obstructive Pulmonary Disease (COPD)	2	6
e.	**Renal disorders**	a1, a2, a3, a4, c1	• Acute renal failure • Chronic kidney disease	2	6
f.	**Seminar**		Seminar to discuss and solve clinical case studies.	1	2

g.	**Infectious disorders**	a1, a2, a3, a4, c1	Antimicrobial regimen selection	1	2
	Oncologic disorders	a1, a2, a3, a4, c1	• Breast cancer	1	2
	Seminar	c1, c2 c3, d1, d2, d3, d4	Seminar to discuss and solve clinical case studies.	1	2
FINAL – EXAM				1	2
TOTAL				16	32

X. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

XI. Assignments Seminars

At the specified time due , group(s) of students will be assigned by the teacher to present a seminar about one topic. The seminar include power point presentation followed by discussion and questions from the teacher and other students

No	Topic	Aligned CILOs	Week Due
1	CVS, endocrinal disorders	c1, c2 c3, d1, d2, d3, d4	6
2	Respiratory, renal disorders	c1, c2 c3, d1, d2, d3, d4	12
3	Infectious, oncologic disorders	c1, c2 c3, d1, d2, d3, d4	15

XII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method			Mark	Proportion to Total course Assessment %	**Aligned CILOs**
1.	Term Works	Quizzes		5	5	b1
		Seminar assessment	Presentation	15	15	c1, c2 c3, d1, d2, d3, d4
			Seminar discussion			
2.	Mid-semester exam (written exam)			20	20	
3.	Final exam (written exam)			60	60	a1, a2, a3, b1, b2
Total				100	100	a1, a2, a3, b1, b2

XIII. Learning Resources:

1- Required Textbook(s) (manimum two).

8. Karen J. Tietze. Clinical skills for pharmacists : A Patient-Focused Approach, Elsevier Inc.
9. James M. Ritter , A text book of clinical pharmacology and therapeutics, HodderArn

2- Essential References.

3. Joseph T. Diprio, Encyclopaedia of clinical pharmacy, Marcel Dekker.
4. Widmann. Good clinical interpretation of laboratory tests

3- Electronic Materials and Web Sites *etc*.

www.en.*wikipedia.org/*

XLVII. Course Policies:	
183.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
184.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
185.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
186.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
187.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
188.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course. Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

CLINICAL PHARMACY II

I. Course Identification and General Information:

1.	Course Title:	CLINICAL PHARMACY II			
2.	Course Code &Number:	PHR522			
3.	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		2	1	-	**3**
4.	Study level/ semester at which this course is offered:	*(5TH) Year – (2nd) semester*			
5.	Pre –requisite (if any):	PHR512 (Clinical pharmacy I)			
6.	Co –requisite (if any):	None			
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FACILITY			
10	Prepared by				
11	Date of Approval				

II. Course Description:

This course is complementary to (clinical pharmacy I) course and both are designed to provide the students with essential knowledge and skills of Assessment of drug therapy (drug therapy monitoring DTM) necessary to select appropriate safe and effective medications for patient`s cases. The course concerns in particular with drug therapy monitoring and also with clinical management and pharmacotherapy of patients having CVS, endocrinal disorders, respiratory, renal, infectious and oncologic disorders.

هذه المقرر التعليمي مكمل للمقرر السابق (الصيدلة السريرية1) وكلاهما مصمم لتزويد الطلاب بالمعرفة والمهارات الأساسية لتقييم العلاج الدوائي (مراقبة العلاج الدوائي DTM) اللازمة لاختيار الأدوية المناسبة والآمنة والفعالة لحالات المريض. يهتم المقرر الدراسي بشكل خاص بمراقبة العلاج الدوائي وكذلك بالإدارة السريرية والعلاج الدوائي للمرضى الذين يعانون من أمراض القلب والشريين واضطرابات الغدد الصماء واضطرابات الجهاز التنفسي والكلى والمعدية والأورام.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A2	Explain the fundamental of social and behavioral sciences.	**a1**. Explain the impact of good behavior and communication of al clinical pharmacists on their relationship with patients and other healthcare professionals
A5	Identify actions of medicines on human body.	**a2**. Identify the therapeutic uses of medicines, their adverse effects and non-pharmacotherapy measures to aid cure of diseases.
A10	Describe the pharmacists role in different pharmacy practices.	**a3.** Describe the role of clinical pharmacists in rational medications use and designing therapeutic regimens for patients
Intellectual skills: upon completion of the course, students will be able to:		
B1	Collect interpret and assess information and data relevant to pharmacy practice	**b1.** Interpret clinical features and other disease data to properly recommend safe and effective medications for patients
B7	Formulate and evaluate patient care plan about rational drug use of medications.	**b2.** Formulate and evaluate patient care plan about ration medication use to improve patient safety and drug efficacy
Professional and practical skills: upon completion of the course, students will be able to:		
C4	Advice patients and healthcare professionals to optimize medicines use.	**c1.** Advise patient and healthcare professionals to optimize medicinal uses.
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c2 .** Search efficiently for information using evidence-based sources.
		c3. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills: upon completion of the course, students will be able to:		

D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate the skills of time management, decision -making and self-learning.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d2.** Participate effectively with his/her colleagues in a team work
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d3.** Take responsibility for adaption to change needs in clinical pharmacy practice
D5	Retrieve essential references of evidence-based to achieve maximal clinical effectiveness.	**d4.** Retrieve essential references of evidence-based practice to achieve maximum clinical effectiveness.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Explain the impact of good behavior and communication of al clinical pharmacists on their relationship with patients and other healthcare professionals	**Active Lecture**	**Written exams**
a2. Identify the therapeutic uses of medicines, their adverse effects and non-pharmacotherapy measures to aid cure of diseases.		
a3. Describe the role of clinical pharmacists in rational medications use and designing therapeutic regimens for patients		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Interpret clinical features and other disease data to properly recommend safe and effective	**Active Lecture, feed-back learning**	**Written exams , quizzes, Assignments**

medications for patients		
b2. Formulate and evaluate patient care plan about ration medication use to improve patient safety and drug efficacy		
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Advise patient and healthcare professionals to optimize medicinal uses.	**feed-back learning**	**Assignments**
c3. Present and report his/her works correctly using appropriate writing rules and technologies media.		
c2 . Search efficiently for information using evidence-based sources.	**feed-back learning**	**Assignments**
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate the skills of time management, decision -making and self-learning.	**feed-back learning**	**Assignments**
d2. Participate effectively with his/her colleagues in a team work		
d3. Take responsibility for adaption to change needs in clinical pharmacy practice		
d4. Retrieve essential references of evidence-based practice to achieve maximum clinical effectiveness.		

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**skills of Assessment of drug therapy(drug therapy monitoring DTM)**	a1, a2, a3, a4, c1	• Objectives • patients need DTM • Drugs require DTM • Steps and methods of DTM • Examples of solved case studies	1	2
2	**Clinical management and pharmacotherapy :** Definition, types, pathogenesis, diagnosis and differentiation, pharmacotherapy (types of drugs, drug selection and algorithm) , non-pharmacotherapy measures				
3	**CVS disorders**	a1, a2, a3, a4, c1	• Hypertension • Angina & Myocardial infarction	2	4
4	**Endocrinal disorders**	a1, a2, a3, a4, c1	• Diabetes mellitus • Thyroid disorders	2	4
5	**Seminar**	c1, c2 c3, d1, d2, d3, d4	Seminar to discuss and solve clinical case studies.	1	
	mid-term exam			1	2
6	**Respiratory disorders**	a1, a2, a3, a4, c1	• Bronchial asthma • Chronic Obstructive Pulmonary Disease (COPD)	2	6
7	**Renal disorders**	a1, a2, a3, a4, c1	• Acute renal failure • Chronic kidney disease	2	6
8	**Seminar**	a1, a2, a3, a4, c1	Seminar to discuss and solve clinical case studies.	1	2
9	**Infectious disorders**	a1, a2, a3, a4, c1	Antimicrobial regimen selection	1	2
10	**Oncologic disorders**	a1, a2, a3, a4, c1	• Breast cancer	1	2

11	**Seminar**	c1, c2 c3, d1, d2, d3, d4	Seminar to discuss and solve clinical case studies.	1	2
FINAL – EXAM				1	2
TOTAL				16	32

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

Group projects: students work on a project in groups of 2 to 3 students. Important for learning by doing ,using the results in practical manner &for promoting team work skills

VI. Assignments Seminars

At the specified time due , group(s) of students will be assigned by the teacher to present a seminar about one topic. The seminar include power point presentation followed by discussion and questions from the teacher and other students

No	Topic	Aligned CILOs	Week Due
1	CVS, endocrinal disorders	c1, c2 c3, d1, d2, d3, d4	6
2	Respiratory, renal disorders	c1, c2 c3, d1, d2, d3, d4	12
3	Infectious, oncologic disorders	c1, c2 c3, d1, d2, d3, d4	15

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method			Mark	Proportion to Total course Assessment %	**Aligned CILOs**
1.	Term Works	Quizzes		5	5	b1
		Assignments	Presentation	15	15	c1, c2 c3, d1, d2, d3, d4
			Seminar discussion			
2.	Mid-semester exam (written exam)			20	20	
3.	Final exam (written exam)			60	60	a1, a2, a3, b1, b2
Total				100	100	a1, a2, a3, b1, b2

VIII. Learning Resources:

1- Required Textbook(s) (manimum two).

1. Karen J. Tietze. Clinical skills for pharmacists : A Patient-Focused Approach, Elsevier Inc.
2. James M. Ritter , A text book of clinical pharmacology and therapeutics, HodderArn

2- Essential References.

1. Joseph T. Diprio, Encyclopaedia of clinical pharmacy, Marcel Dekker.
2. Widmann. Good clinical interpretation of laboratory tests

3- Electronic Materials and Web Sites *etc*.

www.en.*wikipedia.org/*

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

Drug Discovery & Development

Course Code (**PHR523**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

I. Course Identification and General Information:

326	**Course Title:**	**Drug discovery and development**			
327	**Course Code &Number:**	**PHR523**			
328	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	-	-	**2**
329	**Study level/ semester at which this course is offered:**	*(FIFTH) Year – (2nd) semester*			
330	**Pre –requisite (if any):**	--			
331	**Co –requisite (if any):**				
332	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			

333	**Language of teaching the course:**	**ENGLISH**
334	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**
335	**Prepared by**	
336	**Date of Approval**	

L: lecturing ; Tut: Tutorial , S: seminar ; P: practical ; Tr.: training

XII. Course Description:

The course provides the student with knowledge of phases of drug discovery & development of a new drug that include approaches to obtain drugs from natural or chemical sources through to rational drug design, as well as approaches to testing drug efficacy and safety in both preclinical phases (in vitro experiments and on animals) and in clinical trials (experiments on human).

يزود المقرر الطالب بالمعرفة بمراحل اكتشاف الدواء وتطوير دواء جديد و يتضمن ذلك طرق الحصول على الدواء من المصادر الطبيعية أو الكيميائية ، بالإضافة إلى مناهج اختبار فعالية الدواء وسلامته في المراحل قبل السريرية (في المختبر و على حيوانات التجارب) وفي التجارب السريرية (على البشر).

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

68. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A4	Describe analytical methods, principles, design and development techniques	**a1.** Demonstrate an understanding of the timelines and resources required to discover and develop new drugs.
		a2. Describe the critical features of each stage of drug development process
		a3. Describe the role of pharmacists to discover and develop of new drugs
Intellectual skills: upon completion of the course, students will be able to:		

B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify approaches of drug discovery.
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1.** Search for the phases involved for discovery and development of a drug.
Transferable skills: upon completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate skills of time management, problem-solving and decision making.
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d2.** Take responsibility of adaptation to changes need in pharmacy practice.

69. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Demonstrate an understanding of the timelines and resources required to discover and develop new drugs.	**Active Lecture**	**Written exams**
a2. Describe the critical features of each stage of drug development process		
a3. Describe the role of pharmacists to discover and develop of new drugs		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies

b1. Classify approaches of drug discovery.	**Active Lecture , feed-back learning**	**Written exams, quizzes**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
c1. Search for the phases involved for discovery and development of a drug.	**Feed-back learning**	**Assignment**
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate skills of time management, problem-solving and decision making.	**Feed-back learning**	**Assignment**
d2. Take responsibility of adaptation to changes need in pharmacy practice.		

IX. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, a2, a3, b1	• definitions : drug discovery, drug development • History of drug discovery and development • Requirements of modern drug discovery & development	2	4
2	**Sources of drugs**	a1, a2, a3, b1	• Natural sources (plant, animals, minerals/earth)	3	

			• Synthetic sources • Semisynthetic sources • Newer sources: biotechnology including - DNA With Examples of drugs for each sources		6
3	**Approaches of drug discovery**	a1, a2, a3, b1	• Drug targets: definition and types • Definition of Hit 337. Types of Hit 338. Hit identification methods ○ High throughout screening (HTS) ○ Natural substrate ○ Pharmacore: Patent burst ; Structure-based technology (Fragments)	4	8
Mid-term exam				1	2

4	**Phases of drug development**	a1, a2, a3, b1	• Lead identification • Lead optimization • Animal testing • Clinical trails on human • Registration & approval of the drug • Formulation as dosage forms • Clinical trials of the drug product	4	8
Course Review		a1, a2, a3, b1	Review of the course topics by discussion session.	1	2
Final exam				1	2
TOTAL				16	32

Number of Weeks /and Units Per Semester	16 weeks	7 Units

XI. Teaching strategies of the course:

Active lecture: a short lecture/ address followed by discussion

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

XIII. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: Each student is assigned to present a written report on discovery and a development of a clinically used drug	b2, c1, d1, d2	4-13	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b1
		Assignments	7, 12	10	10	c1, d1, d2
2	Mid-semester exam of theoretical part (written exam		7	20	20	a1, a2, a3, b1
3	Final exam of theoretical part (written exam)		16	60	60	a1, a2, a3, b1
		TOTAL		100	100 %	

XIV. Learning Resources:

1- Required Textbook(s) (maximum two).
Benjamin E Blass , Principles of Drug Discovery and Development by, 2015
2- Essential References.
Raymond G Hill, Duncan Richards. Drug Discovery and Development Technology in Transition, 2021, Elsevier
3- Electronic Materials and Web Sites *etc*.
https://www.norwayhealthtech.com/content/uploads/2017/09/drug-discovery-and-dev-oslo-oct-12-2017-kde.pdf

XLVIII. Course Policies:

189.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
190.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
191.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
192.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
193.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course

194.	**Plagiarism:** Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

DRUG DISCOVERY & DEVELOPMENT

I. Course Identification and General Information:

1.	Course Title:	Drug discovery and development			
2.	Course Code &Number:	PHR523			
3.	Credit hours:	C.H			TOTAL
		L.	P.	Tr.	
		2	-	-	**2**
4.	Study level/ semester at which this course is offered:	*(FIFTH) Year – (2nd) semester*			
5.	Pre –requisite (if any):	--			
6.	Co –requisite (if any):				
7.	Program (s) in which the course is offered:	Pharmacy Bachelor			
8.	Language of teaching the course:	ENGLISH			
9.	Location of teaching the course:	AT THE UNIVERSITY FACILITY			
10.	Prepared by				
11.	Date of Approval				

II. Course Description:

The course provides the student with knowledge of phases of drug discovery & development of a new drug that include approaches to obtain drugs from natural or chemical sources through to rational drug design, as well as approaches to testing drug efficacy and safety in both preclinical phases (in vitro experiments and on animals) and in clinical trials (experiments on human).

يزود المقرر الطالب بالمعرفة بمراحل اكتشاف الدواء وتطوير دواء جديد و يتضمن ذلك طرق الحصول على الدواء من المصادر الطبيعية أو الكيميائية ، بالإضافة إلى مناهج اختبار فعالية الدواء وسلامته في المراحل قبل السريرية (في المختبر و على حيوانات التجارب) وفي التجارب السريرية (على البشر).

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A4	Describe analytical methods, principles, design and development techniques	**a1.** Demonstrate an understanding of the timelines and resources required to discover and develop new drugs.
		a2. Describe the critical features of each stage of drug development process
		a3. Describe the role of pharmacists to discover and develop of new drugs
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Classify approaches of drug discovery.
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1.** Search for the phases involved for discovery and development of a drug.
Transferable skills: upon completion of the course, students will be able to:		
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d1.** Demonstrate skills of time management, problem-solving and decision making.
D4	Take the responsibility for adaption to change needs in pharmacy practice.	**d2.** Take responsibility of adaptation to changes need in pharmacy practice.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Demonstrate an understanding of the timelines and resources required to discover and develop new drugs.	**Active Lecture**	**Written exams**
a2. Describe the critical features of each stage of drug development process		
a3. Describe the role of pharmacists to discover and develop of new drugs		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify approaches of drug discovery.	**Active Lecture , feed-back learning**	**Written exams, quizzes**

(c) Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

c1. Search for the phases involved for discovery and development of a drug.	**Feed-back learning**	**Assignment**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Demonstrate skills of time management, problem-solving and decision making.	**Feed-back learning**	**Assignment**
d2. Take responsibility of adaptation to changes need in pharmacy practice.		

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction**	a1, a2, a3, b1	• definitions : drug discovery, drug development • History of drug discovery and development • Requirements of modern drug discovery & development	2	4
2	**Sources of drugs**	a1, a2, a3, b1	• Natural sources (plant, animals, minerals/earth) • Synthetic sources • Semisynthetic sources • Newer sources: biotechnology including - DNA With Examples of drugs for each sources	3	6
3	**Approaches of drug discovery**	a1, a2, a3, b1	• Drug targets: definition and types • Definition of Hit 12. Types of Hit 13. Hit identification methods ○ High throughout screening (HTS) ○ Natural substrate ○ Pharmacore: Patent burst ; Structure-based technology (Fragments)	4	8
Mid-term exam				1	2

4	**Phases of drug development**	a1, a2, a3, b1	• Lead identification • Lead optimization • Animal testing • Clinical trails on human • Registration & approval of the drug • Formulation as dosage forms • Clinical trials of the drug product	4	8
Course Review		a1, a2, a3, b1	Review of the course topics by discussion session.	1	2
Final exam				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

V. Teaching strategies of the course:

Active lecture: a short lecture/ address followed by discussion

Feed-back learning: students are individually asked to do perform quick tests (quiz) or to do certain assignments such lab. experiments, problems solving, homework, topics summarizing or internet search. The teacher will provide them feed-back correction & evaluation

VI. Assignments:

No	Assignments	Aligned CILOs	Week Due	
1	**Individual**: Each student is assigned to present a written report on discovery and a development of a clinically used drug	b2, c1, d1, d2	4-13	

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13, 14	10	10	b1
		Assignments	7, 12	10	10	c1, d1, d2
2	Mid-semester exam of theoretical part (written exam		7	20	20	a1, a2, a3, b1
3	Final exam of theoretical part (written exam)		16	60	60	a1, a2, a3, b1
		TOTAL		100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Benjamin E Blass , Principles of Drug Discovery and Development , 2015

2- Essential References.

Raymond G Hill, Duncan Richards. Drug Discovery and Development Technology in Transition, 2021, Elsevier

3- Electronic Materials and Web Sites *etc*.

https://www.norwayhealthtech.com/content/uploads/2017/09/drug-discovery-and-dev-oslo-oct-12-2017-kde.pdf

IX.Course Policies:	
1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

GRADUATION PROJECT

Course Code (**FMS525**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

LII. Course Identification and General Information:							
33	**Course Title**	**GRADUATION RESEARCH PROJECT**					
34	**Course Code &Number:**	**FMS525**					
34	**Credit hours:**	C.H					TOTAL
		L.			P.	Tr.	
		-	2	-	-	-	**2**
34	**Study level/ semester at which this course is offered:**	*(Fifth) Year – (2ND) semester*					
34	**Pre –requisite (if any):**	**All specific program courses + Biostatistics**					
34	**Co –requisite (if any):**	• **None**					

34	**Program (s) in which the course is offered:**	**All Bachelor programs offered by the faculty**
34	**Language of teaching the course:**	**ENGLISH**
34	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**
34	**Prepared by**	
34	**Date of Approval**	

L: lecturing ; Tut: Tutorial , S: seminar ; P: practical ; Tr.: training

LIII. Course Description:

This course is a fulfillment for graduation from the program. designed to provide the students skills of practicing scientific research and regard the first experimental practice done by students to learn the scientific research.

هذه المقرر هو المكمل للتخرج من البرنامج. ويهدف هذا المقرر إلى إكساب الطلاب مهارات ممارسة البحث العلمي ويعتبر أول ممارسة تجريبية يقوم بها الطلاب لتعلم البحث العلمي.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

70. Alignment CILOs to PILOs

PILOs		CILOs
Intellectual skills: upon completion of the course, students will be able to:		
B8	Use appropriate research methods including experimental, observational and electronic to collect data and solve problems.	**b1.** Use appropriate research methods to conduct the graduation project.
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1.** Conduct research studies and utilize the results in different pharmacy fields.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues,	**d1**. Communicate effectively and behave in discipline with colleagues and supervisor

	patients and healthcare professionals effectively in team-activities.	
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate skills of effective presentation and time-management.
D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3**. Participate successfully with colleagues in team work
D5	Retrieve essential references of evidence-based to achieve maximal clinical effectiveness	**d4**. Retrieve evidence-based references while proposing, conducting and writing the research papers.

71. Alignment CILOs to assessment strategies	
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Assessment Strategies:	
Course Intended Learning Outcomes	Assessment Strategies
b1. Use appropriate research methods to conduct the graduation project.	**Research methodology assessment (by internal and external examiner)**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Assessment Strategies:	
Course Intended Learning Outcomes	Assessment Strategies
c1. Conduct research studies and utilize the results in different pharmacy fields.	**Research methodology assessment (by internal and external examiner)**
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Assessment	

Strategies:	
Course Intended Learning Outcomes	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues and supervisor	**Attitude assessment (by the supervisor)**
d2. Demonstrate skills of effective presentation and time-management.	**Presentation assessment (by internal and external examiner)**
d3. Participate successfully with colleagues in team work	**Participation assessment (by the supervisor)**
d4. Retrieve evidence-based references while proposing, conducting and writing the research papers.	**Research methodology assessment (by internal and external examiner)**

X. Course Content:

- Each 4-7 students group is assigned to do a research (experimental or observational) directied by a supervisor of the department teaching staff or outside the faculty.
- The topic of research can be proposed by :
  - The supervisor
  - Or the students after supervisor acceptance
- The topic must be approved by the department/faculty administration.
- Experiments are carried out in the faculty laboratories and if necessary outside the faculty
- The department and the faculty provide the students with necessary instruments and materials
- The research is to be carried out within the period of the term (i.e. 16 weeks) and must be delivered to the department within that period
- The faculty propose the name of committee members to the faculty council . The committee will discuss and judge the research as described below in the assessment schedule .

V. Schedule of Assessment Tasks for Students During the Semester

Each project will be assessed by a committee of three member as follows

Items	Weight	Aligned CILOs
Project supervisor	70 %	c1, d1, d3
Internal examiner : a member of the department teaching stuff.	15 %	b1, c1, d2, d4
external examiner : a qualified external examiner (either from other departments of the faculty or from another university)	15 %	
Total	**100**	

Assessment of the project by the project supervisor		
Items	**Mark** [1]	**Aligned CILOs**
Attitude	30	d1
Participation	40	c1, d3
Total	**70**	

[1]: Every student will be assessed by the supervisor individually.

Assessment of the project by the internal examiner		
Items	**Mark** [1]	**Aligned CILOs**
Research methodology	10	b1, c1, d4
Research presentation	*5*	d2
Total	**15**	

[1]: The whole students will be assessed by the internal as one unit

Assessment of the project by the external examiner		
Items	**Mark** [1]	**Aligned CILOs**
Research methodology	10	b1, c1, d4
Presentation	*5*	d2
Total	**15**	

[1]: The whole students will be assessed by the internal as one unit

VI. Learning Resources:
1- Required Textbook(s) (maximum two).
10. Variable
2- Essential References.
1. Variable
3- Electronic Materials and Web Sites *etc*.
Variable

XLIX. Course Policies:	
195.	**Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

GRADUATION PROJECT

I. Course Identification and General Information:							
1.	Course Title	GRADUATION RESEARCH PROJECT					
2.	Course Code &Number:	FMS525					
3.	Credit hours:	C.H					TOTAL
		L.			P.	Tr.	
		-	2	-	-	-	2
4.	Study level/ semester at which this course is offered:	*(Fifth) Year – (2ND) semester*					
5.	Pre –requisite (if any):	All specific program courses + Biostatistics					
6.	Co –requisite (if any):	• None					
7.	Program (s) in which the course is offered:	All Bachelor programs offered by the faculty					
8.	Language of teaching the course:	ENGLISH					
9.	Location of teaching the course:	AT THE UNIVERSITY FACILITY					
10	Prepared by						
11	Date of Approval						

II. Course Description:

This course is a fulfillment for graduation from the program. designed to provide the students skills of practicing scientific research and regard the first experimental practice done by students to learn the scientific research.

هذه المقرر هو المكمل للتخرج من البرنامج. ويهدف هذا المقرر إلى إكساب الطلاب مهارات ممارسة البحث العلمي ويعتبر أول ممارسة تجريبية يقوم بها الطلاب لتعلم البحث العلمي.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Intellectual skills: upon completion of the course, students will be able to:		
B8	Use appropriate research methods including experimental, observational and electronic to collect data and solve problems.	**b1.** Use appropriate research methods to conduct the graduation project.
Professional and practical skills: upon completion of the course, students will be able to:		
C7	Conduct research and utilize the results in different pharmaceutical fields.	**c1.** Conduct research studies and utilize the results in different pharmacy fields.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1**. Communicate effectively and behave in discipline with colleagues and supervisor
D2	Develop and demonstrate skills of time managements, self-learning and decision making.	**d2.** Demonstrate skills of effective presentation and time-management.

D3	Participate collaboratively in team work with colleagues and healthcare professionals.	**d3**. Participate successfully with colleagues in team work
D5	Retrieve essential references of evidence-based to achieve maximal clinical effectiveness	**d4**. Retrieve evidence-based references while proposing, conducting and writing the research papers.

2. Alignment CILOs to assessment strategies

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Assessment Strategies:

Course Intended Learning Outcomes	Assessment Strategies
b1. Use appropriate research methods to conduct the graduation project.	**Research methodology assessment (by internal and external examiner)**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Assessment Strategies:

Course Intended Learning Outcomes	Assessment Strategies
c1. Conduct research studies and utilize the results in different pharmacy fields.	**Research methodology assessment (by internal and external examiner)**

(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Assessment Strategies:

Course Intended Learning Outcomes	Assessment Strategies
d1. Communicate effectively and behave in discipline with colleagues and supervisor	**Attitude assessment (by the supervisor)**

d2. Demonstrate skills of effective presentation and time-management.	**Presentation assessment (by internal and external examiner)**
d3. Participate successfully with colleagues in team work	**Participation assessment (by the supervisor)**
d4. Retrieve evidence-based references while proposing, conducting and writing the research papers.	**Research methodology assessment (by internal and external examiner)**

IV. Course Content:

- Each 4-7 students group is assigned to do a research (experimental or observational) directied by a supervisor of the department teaching staff or outside the faculty.
- The topic of research can be proposed by :
  - The supervisor
  - Or the students after supervisor acceptance
- The topic must be approved by the department/faculty administration.
- Experiments are carried out in the faculty laboratories and if necessary outside the faculty
- The department and the faculty provide the students with necessary instruments and materials
- The research is to be carried out within the period of the term (i.e. 16 weeks) and must be delivered to the department within that period
- The faculty propose the name of committee members to the faculty council . The committee will discuss and judge the research as described below in the assessment schedule .

V. Schedule of Assessment Tasks for Students During the Semester

Each project will be assessed by a committee of three member as follows

Items	Weight	Aligned CILOs
Project supervisor	70 %	c1, d1, d3
Internal examiner : a member of the department teaching stuff.	15 %	b1, c1, d2, d4

external examiner : a qualified external examiner (either from other departments of the faculty or from another university)	15 %	
Total	**100**	

Assessment of the project by the project supervisor		
Items	**Mark** [1]	**Aligned CILOs**
Attitude	30	d1
Participation	40	c1, d3
Total	**70**	

[1]: Every student will be assessed by the supervisor individually.

Assessment of the project by the internal examiner		
Items	**Mark** [1]	**Aligned CILOs**
Research methodology	10	b1, c1, d4
Research presentation	*5*	d2
Total	**15**	

[1]: The whole students will be assessed by the internal as one unit

Assessment of the project by the external examiner		
Items	**Mark** [1]	**Aligned CILOs**
Research methodology	10	b1, c1, d4
Presentation	*5*	d2
Total	**15**	

[1]: The whole students will be assessed by the internal as one unit

VI. Learning Resources:

1- Required Textbook(s) (maximum two).

1. Variable

2- Essential References.

1. Variable

3- Electronic Materials and Web Sites *etc*.

Variable

VII. Course Policies:	
1.	**Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam

Republic of Yemen

Ministry of Higher Education & Scientific Research

جامعة آزال للتنمية البشرية
Azal University for Human Development

Faculty of Medical Science
Department of Pharmacy

Program of Pharmacy Bachelor

Course Specification of

PHARMACEUTICAL MARKETING

Course Code (**PHR521**)

This template of course specifications was prepared by CAQA, Yemen, 2017.

LIV. Course Identification and General Information:

35	**Course Title:**	**PHARMACEUTICAL MARKETING**			
35	**Course Code &Number:**	**PHR521**			
35	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	-	-	**2**
35	**Study level/ semester at which this course is offered:**	*(5TH) Year – (2nd) semester*			
35	**Pre –requisite (if any):**				
35	**Co –requisite (if any):**				
35	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
35	**Language of teaching the course:**	**ENGLISH**			
35	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**			
35	**Prepared by**				
36	**Date of Approval**				

L: lecturing ;; P: practical ; T.: training

LV. Course Description:

This course is designed to provide the students with knowledge, ability and skills required to effectively promote pharmaceutical and cosmetic products. The course also concerns with skills of self-promotion including preparation of CV and practicing effective Job interview. The course also concerns with skills of self-supporting of pharmacist in the work market.

تم تصميم هذه المقرر لتزويد الطلاب بالمعرفة والقدرة والمهارات اللازمة للترويج الفعال للمنتجات الصيدلانية والتجميلية. يهتم هذا المقرر أيضًا بمهارات الترويج الذاتي بما في ذلك إعداد السيرة الذاتية وممارسة مقابلة العمل الفعالة. كما يهتم المقرر بمهارات الدعم الذاتي للصيدلي في سوق العمل.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

72. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A9	Define the basis of health policy, Pharmacoeconomics, pharmacoepidemology , pharmaceutical marketing and administration.	**a1.** Define the basis of marketing and its strategies and applications in pharmacy.
A10	Describe the pharmacists role in different pharmacy practices.	**a2.** Describe the role of pharmacist in promoting pharmaceutical and cosmetic products
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Plan a modern marketing strategy to promote pharmaceutical and cosmetic products.
Professional and practical skills: upon completion of the course, students will be able to:		
C3	Screen for drugs from different sources and	**c1.** Apply marketing rules to apply to jobs

	carry out pharmacy relevant experiments successfully.	and to promote pharmaceutical and cosmetic products.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Interact and communicate effectively with healthcare professional during marketing of pharmaceutical and cosmetic products.

73. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Define the basis of marketing and its strategies and applications in pharmacy.	**Active Lecture**	**Written exams**
a2. Describe the role of pharmacist in promoting pharmaceutical and cosmetic products		

(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Plan a modern marketing strategy to promote pharmaceutical and cosmetic products.	**Active Lecture**	**Written exams**

(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Apply marketing rules to apply to jobs and to promote pharmaceutical and cosmetic products.	**Feed -back learning (seminar)**	**Assignment assessment**
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Interact and communicate effectively with healthcare professional during marketing of pharmaceutical and cosmetic products.	**Feed -back learning (seminar)**	**Assignment assessment**

XI. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to marketing**	a1, a2, b1	• definitions, (markets, marketing, promotion, promotional materials, products, competitors, customers, marketing targets, plan and planning • Significance and objectives of marketing	1	2
2	**Requirements of a successful marketing**	a1, a2, b1	• personnel, mental, skills communication and relationship building • Strategy of marketing: planning, execution, evaluation • Designing a marketing plan	2	4
3	**Understanding the customers**	a3, b1	• Types of customers • Dealing with customers • customers need and satisfaction	1	2

4	**Pharmaceutical marketing**	a1, a2, b1	• significance • Who is the med. Rep. ? • ethical issues • Pharmaceutical products: differences from other products, essential information to be full known on pharmaceutical products (pharmaceutical, pharmacological, commercial)properties • Pharmaceutical Promotional materials: brochures, gifts, charts, etc.	3	6
Mid-term exam				1	2
5	**Role play:**	a1, a2, b1	• **Training on visiting to customers (physicians)** : pre-visit preparation ad skills of effective visit (meeting, opening, offering, closing), post-visit evaluation	1	2
6	**Self-marketing { C.V)**	a1, a2, b1	• How to prepare C.V.	1	2
	Self-marketing (Job applications and interview)	a1	• Requirements of successful job application and interview	1	2
7	**Feed back learning (1)**	c1, d1	• Role play	2	4
	Feed back learning (2)	c1, d1	• CV preparation	1	4
	Feed back learning (3)	c1, d1	• Job interview	1	4
FINAL - EXAM				1	2
TOTAL				16	32

Number of Weeks /and Units Per Semester	16 weeks	7 Units

XII. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed back learning : The student(s) is assigned to present one-related topic with discussion such topic with other students

VI. Assignments (Feed back learning)

No	Topic	Aligned CILOs	Week Due
Individual: every student is assigned to participate in one of the following Feed back learning tasks 1-			
1	Role play marketing	c1, d1	12, 13
2	Job interview	c1, d1	14
3	CV preparation	c1, d1	15

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13	5	5	c1
		Assignments	12, 13, 14, 15	15	15	c1, d1
2	Mid-semester exam of theoretical part (written exam		7	20	20	a1, a2, b1
3	Final exam of theoretical part (written exam)		16	60	60	a1, a2, b1
			TOTAL	100	100 %	

XV. Learning Resources:

1- Required Textbook(s) (maximum two).

4. Ross Mulner. Pharmaceutical marketing, Journal of Consumer Marketing, 2005

2- Essential References.

2. Handbook of pharmaceutical marketing

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/AshishAgrawal135/pharmaceutical-marketing-by-vikram-mathariya
2. https://www.slideshare.net/alijehangir/pharmaceuticals-marketing-strategies

L. Course Policies:

196.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
197.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.

198.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
199.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
200.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
201.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

Second Part of Course Specification

Faculty of Medical Science

Department of Pharmacy

Program of Pharmacy Bachelor

Course Plan (Syllabus) of

PHARMACEUTICAL MARKETING

I. Course Identification and General Information:

1.	**Course Title:**	**PHARMACEUTICAL MARKETING**			
2.	**Course Code &Number:**	**PHR521**			
3.	**Credit hours:**	C.H			TOTAL
		L.	P.	Tr.	
		2	-	-	**2**
4.	**Study level/ semester at which this course is offered:**	*(5TH) Year – (2nd) semester*			
5.	**Pre –requisite (if any):**				
6.	**Co –requisite (if any):**				
7.	**Program (s) in which the course is offered:**	**Pharmacy Bachelor**			
8.	**Language of teaching the course:**	**ENGLISH**			
9.	**Location of teaching the course:**	**AT THE UNIVERSITY FACILITY**			
10	**Prepared by**				
11	**Date of Approval**				

II. Course Description:

This course is designed to provide the students with knowledge, ability and skills required to effectively promote pharmaceutical and cosmetic products. The course also concerns with skills of self-promotion including preparation of CV and practicing effective Job interview. The course also concerns with skills of self-supporting of pharmacist in the work market.

تم تصميم هذه المقرر لتزويد الطلاب بالمعرفة والقدرة والمهارات اللازمة للترويج الفعال للمنتجات الصيدلانية والتجميلية. يهتم هذا المقرر أيضًا بمهارات الترويج الذاتي بما في ذلك إعداد السيرة الذاتية وممارسة مقابلة العمل الفعالة. كما يهتم المقرر بمهارات الدعم الذاتي للصيدلي في سوق العمل.

III. Intended learning outcomes of the course (CILOs) and their alignment to Program Intended learning outcomes (PILOs), teaching strategies and assessment strategies

1. Alignment CILOs to PILOs

PILOs		CILOs
Knowledge and understanding: upon completion of the course, students will be able to:		
A9	Define the basis of health policy, Pharmacoeconomics, pharmacoepidemology , pharmaceutical marketing and administration.	**a1.** Define the basis of marketing and its strategies and applications in pharmacy.
A10	Describe the pharmacists role in different pharmacy practices.	**a2.** Describe the role of pharmacist in promoting pharmaceutical and cosmetic products
Intellectual skills: upon completion of the course, students will be able to:		
B2	Classify drugs, approaches and other information relevant to pharmacy based on scientific classification system.	**b1.** Plan a modern marketing strategy to promote pharmaceutical and cosmetic products.
Professional and practical skills: upon completion of the course, students will be able to:		
C3	Screen for drugs from different sources and carry out pharmacy relevant experiments successfully.	**c1.** Apply marketing rules to apply to jobs and to promote pharmaceutical and cosmetic products.
Transferable skills: upon completion of the course, students will be able to:		
D1	Interact and communicate effectively and behave in disciplines with colleagues, patients and healthcare professionals effectively in team-activities.	**d1.** Interact and communicate effectively with healthcare professional during marketing of pharmaceutical and cosmetic products.

2. Alignment CILOs to teaching strategies and assessment strategies

(a) Alignment Course Intended Learning Outcomes (CILOs) of knowledge & understanding to Teaching Strategies and Assessment Strategies

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Define the basis of marketing and its strategies and applications in pharmacy.	**Active Lecture**	**Written exams**

a2. Describe the role of pharmacist in promoting pharmaceutical and cosmetic products		
(b) Alignment Course Intended Learning Outcomes (CILOs) of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Plan a modern marketing strategy to promote pharmaceutical and cosmetic products.	**Active Lecture**	**Written exams**
(c)Alignment Course Intended Learning Outcomes (CILOs) of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Apply marketing rules to apply to jobs and to promote pharmaceutical and cosmetic products.	**Feed -back learning (seminar)**	**Assignment assessment**
(d) Alignment Course Intended Learning Outcomes (CILOs) of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Interact and communicate effectively with healthcare professional during marketing of pharmaceutical and cosmetic products.	**Feed -back learning (seminar)**	**Assignment assessment**

IV. Course Content:

Order	Units/ Topics List	CILOs	Sub Topics List	No. of Weeks	contact hours
1	**Introduction to marketing**	a1, a2, b1	• definitions, (markets, marketing, promotion, promotional materials, products, competitors, customers, marketing targets, plan and planning • Significance and objectives of marketing	1	2
2	**Requirements of a successful marketing**	a1, a2, b1	• personnel, mental, skills communication and relationship building • Strategy of marketing: planning, execution, evaluation • Designing a marketing plan	2	4
3	**Understanding the customers**	a3, b1	• Types of customers • Dealing with customers • customers need and satisfaction	1	2
4	**Pharmaceutical marketing**	a1, a2, b1	• significance • Who is the med. Rep. ? • ethical issues • Pharmaceutical products: differences from other products, essential information to be full known on pharmaceutical products (pharmaceutical, pharmacological, commercial)properties • Pharmaceutical Promotional materials: brochures, gifts, charts, etc.	3	6
Mid-term exam				1	2
5	**Role play:**	a1, a2, b1	• **Training on visiting to customers (physicians)** : pre-	1	

			visit preparation ad skills of effective visit (meeting, opening, offering, closing), post-visit evaluation		2
6	**Self-marketing { C.V)**	a1, a2, b1	• How to prepare C.V.	1	2
	Self-marketing (Job applications and interview)	a1	• Requirements of successful job application and interview	1	2
7	**Feed back learning (1)**	c1, d1	• Role play	2	4
	Feed back learning (2)	c1, d1	• CV preparation	1	4
	Feed back learning (3)	c1, d1	• Job interview	1	4
FINAL - EXAM				1	2
TOTAL				16	32
Number of Weeks /and Units Per Semester				16 weeks	7 Units

V. Teaching strategies of the course:

Active Lecture It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups (50-200) or in sessions, which consist of more than one group gathered in one classroom.
The efficiency of lecturing can be enhanced by using techniques such as **Brain-storming**: It depends on stimulation of the student`s brain through a group of questions &/or **Concepts map**: which depends on sequencing of thoughts in the form of maps with horizontal or vertical relations & by using **learning aids** such as Data show projector

Feed-back learning : The student(s) is assigned to present one-related topic with discussion such topic with other students

VI. Assignments (Feed-back learning)

No	Topic	Aligned CILOs	Week Due
Individual: every student is assigned to participate in one of the following Feed back learning tasks 2-			
1	Role play marketing	c1, d1	12, 13
2	Job interview	c1, d1	14
3	CV preparation	c1, d1	15

VII. Schedule of Assessment Tasks for Students During the Semester

No.	Assessment Method		Week Due	Mark	Proportion of Total course Assessment	Aligned Course Learning Outcomes (CILOs)
1	Term Works	Quizzes	4-13	5	5	c1
		Assignments	12, 13, 14, 15	15	15	c1, d1
2	Mid-semester exam of theoretical part (written exam		7	20	20	a1, a2, b1
3	Final exam of theoretical part (written exam)		16	60	60	a1, a2, b1
		TOTAL		100	100 %	

VIII. Learning Resources:

1- Required Textbook(s) (maximum two).

Ross Mulner. Pharmaceutical marketing, Journal of Consumer Marketing, 2005

2- Essential References.

Handbook of pharmaceutical marketing

3- Electronic Materials and Web Sites *etc*.

1. https://www.slideshare.net/AshishAgrawal135/pharmaceutical-marketing-by-vikram-mathariya
2. https://www.slideshare.net/alijehangir/pharmaceuticals-marketing-strategies

IX.Course Policies:

1.	**Class Attendance:** At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	**Tardy:** any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	**Exam Attendance/Punctuality:** any student who is late for more than 30 minutes from starting the exam will not be allowed to attend the exam and will be considered absent.
4.	**Assignments & Projects**: Assignments and projects will be assessed individually unless the teacher request for group work
5.	**Cheating**: Cheating by any means will cause the student failure and he/she must re-study the course
6.	**Plagiarism**: Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.