General pathology Course Specification

Faculty: Faculty of Medical Sciences

Program :Bachelor of Laboratory Medicine

I. Course Identification and General Information:

١	**Course Title:**	**General pathology**				
٢	**Course Code & Number:**	*PH1123125*				
٣	**Credit hours: 3**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		0		*3*
٤	**Study level/ semester at which this course is offered:**	3rd Level/1st semester				
٥	**Pre –requisite (if any):**					
٦	**Co –requisite (if any):**					
٨	**Program (s) in which the course is offered:**	**Bachelor of Pharmacy**				
٩	**Language of teaching the course:**	**English**				
١٠	**Location of teaching the course:**	**Thamar University**				
11	**Prepared By:**	**Dr: Walid Aldahibi**				
12	**Date of Approval**					

II. Course Description:

The curriculum of general pathology aims at preparing the students in basic understanding of diseases and their pathogenesis. Introduction to pathology, basic definitions and familiarization with the common terms used in pathology, causes and mechanisms of cell injury, reversible and irreversible injury, systemic pathology, introduction of hyperplasia, hypoplasia, hypertrophy, atrophy, metaplasia, necrosis and apoptosis and microscopic features of pathological matters.

III. Course Intended Learning Outcomes (CILOs) :

Knowledge and Understanding:

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

Knowledge and Understanding PILOs		Knowledge and Understanding CILOs
After completing this program, students would be able to:		After completing this course, students would be able to:
A1	**a1**	Demonstrate knowledge and understanding of the pathological terminologies, the concept of cell injury, the change produces thereby, in the different tissues and organs and the body capacity for healing.
A6	**a2**	Explain the etiopathogenesis, the pathological effects, and the c1inicopathological correlation of common infectious and non-infectious diseases.
A2,A4	**a3**	Demonstrate knowledge and understanding of the concept of neoplasia with respect to etiology, gross and microscopic features, diagnosis and prognosis in different tissues and organs of the body.

Intellectual Skills :

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

Intellectual Skills PILOs	Intellectual Skills CILOs	
After completing this program, students would be able to:	After completing this course, students would be able to:	
B1	**b1**	Select the necessary techniques for sample reception & processing according to the nature of specimen received.
B4	**b2**	Correlate normal and altered morphology (gross and microscopy) of different organ systems in different diseases to the extent needed of understanding of the disease processes and their clinical significance
B1	**b3**	Integrate the normal homeostatic mechanism, to recognize the derangements of these mechanism and the effect on human system.

Transferable (General) Skills :		
Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)		
Transferable (General) Skills PILOs	Transferable (General) Skills CILOs	
After completing this program, students would be able to:		After completing this course, students would be able to:
D2, D5	d1	Communicate effectively and display ethical conduct during classes and in interactions with instructors, other students and patients.
D4,D6	d2	Evaluate research and published studies to remain informed of new techniques and procedures.

	Alignment Course Intended Learning Outcomes to Teaching Strategies and Assessment Strategies		
	(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes		**Teaching strategies**	**Assessment Strategies**
a1	Demonstrate knowledge and understanding of the pathological terminologies, the concept of cell injury, the change produces thereby, in the different tissues and organs and the body capacity for healing.	-Interactive Lectures -Self-learning -Brain storming, problem solving	Quiz, written exam, homework,
a2	Explain the etiopathogenesis, the pathological effects, and the c1inicopathological correlation of common infectious and non-infectious diseases.	PowerPoint, presentations, Tutorial	Written exam, Quiz, assignment
a3	Demonstrate knowledge and understanding of the concept of neoplasia with respect to etiology, gross andmicroscopic features, diagnosis and prognosis in different tissues	lecture, group discussion, electronic learning, laboratory session,	Written exam, laboratory performance,

	and organs of thebody.	tutorial seminar	assignment.
	(B) Alignment Course Intended Learning Outcomes of Intellectual Skillsto Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes		**Teaching strategies**	**Assessment Strategies**
b1	Select the necessary techniques for sample reception & processing according to the nature of specimen received.	Lecture, tutorial, laboratory session, Brainstorm	Written exam lab report, quiz
b2	Correlate normal and altered morphology (gross and microscopy) of different organsystems in different diseases to the extent needed of understanding of the diseaseprocesses and their clinical significance	Tutorial, laboratory session. Problem solving	Assignment , oral examination, lab report, practical exam
b3	Integrate the normal homeostatic mechanism, to recognize the derangements of these mechanism and the effect on human system.	Lecture, Laboratory session, , problem based study	Written exam, practical exam, assignment .
	(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 display ethical conduct during classes and in interactions with instructors, other students and patients,	Group Discussion, laboratory performance presentation. Seminar	Oral presentation, oral exam, seminar, laboratory performance assessment
d2	Evaluate research and published studies to remain informed of new techniques and procedures.	Electronic learning, workshop participation, assignment	assignment, workshop report, research report.

V- Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Learning Outcomes	Number of Weeks	contact hours
1	Cellular response to injury:	Stress and adaptation Cell injury. Necrosis & apoptosis. Pathologic calcification, deposition & pigmentation. Cellular aging.	a1-a3,b2,b3	1	2
2	Acute inflammation:	Definition, signs, components & mechanism Chemical mediators of inflammation. Outcomes, morphological types. Systemic and local effect of inflammation. Defects in leukocyte function.	a1a2, b1-b3, d1	1	2
3	Chronic inflammation:	Chronic inflammation: Definition, causes, mechanism & morphology. Granulomatous inflammation. Morphologic patterns in inflammation. Role of lymphatic in inflammation.	a1,a2, b1-b3, d1, d2	1	2
4	Cell Regeneration	Cell Regeneration, healing & repair. Scar & keloid Stem cell concept in disease and therapy	a1,a2, b1-b3, d1, d2	1	2
5	Homodynamic disturbances	Edema Hyperemia & congestion.	a1,a3,b2,3,d2,d2	1	2
6	Hemostasis & coagulation	Components of hemostasis. Thrombosis. Embolization. Ischemia and Infarction	a1, a3	1	2
7	Midterm exam	Exam	a1-a3, b1-b3, d1, d2	1	2
8	Neoplasia	Neoplasia Neoplasia: Definition,	a1-a3,b1, b2,3,d2,d2	2	4

		incidence, terminology & classification. Characteristics of benign & malignant tumors. Dysplasia & carcinoma in situ. Epidemiology of cancer, role of heredity. Premalignant conditions. Molecular basis of cancer (oncogenes & tumor suppressor genes). Biology tumor growth. Etiology of cancer, (Chemical, radiation& viral oncogenesis). Clinical effects of tumors, cachexia &paraneoplastic conditions. Grading & staging of tumors. Laboratory diagnosis of tumors.			
9	Medical genetics	:Introduction & principles. Mendelian disorders: types & characteristics. Cytogenetic disorders. Multifactorial disorders. Investigations& diagnosis of genetic disorders	a1,a2,b1-b3, d1,d2	1	2
10	Immunological disorders:	Definition , cells , types , immune response , HLA and cytokines Immunodeficiency Hypersensitivity reactions Tolerance Autoimmunity Immunity to infections Vaccines Transplantation immunology Tumour immunology Miscellaneous e.g. immunodiagnosis, immunotherapy, immunomodulation	a1,a2,b1-b3, d1,d2	2	4

11	Pathology of infectious disease	Pathology of infectious disease	a2- b1-b3, d1,d2	1	2
12	Pathophysiology of systemic disease	• Renal diseases • Endocrine diseases • Musculoskeletal diseases Gastrointestinal , liver , pancreas diseases	a1-a3,b1-b3,d1,d2,	2	4
13	Final exam		a1-a3,b1-b3,d1,d2,	1	2
Number of Weeks /and Units Per Semester				**16**	**32**

VI- Teaching strategies of the course:

- Lectures using data show, video animation and seminars, electronic learning
- Solving Problem method, Laboratory work, directed reading, independent study and discussion

I. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Seminar on Molecular basis of cancer (oncogenes & tumor suppressor genes)	a3,b1,d2	8	5
2	Lab report	b1-b3, c1-c2	Every week	5
3	Presentation, homework	a1, d1, d2	6	5

II. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Presentation & Home works	6	5	5%	a1, d1, d2
2	Lab Report	ALL	5	5 %	b1-b3, c1-c3
3	seminar	Every week	5	5%	b1-b3, c1-c2
4	Quizzes	3,5,10	5	5%	a1,a2,b1,b2
5	Midterm exam	7	10	10%	a1-a3, b1-b3, d1, d2
	Midterm practical	8	10	10%	b1-b3,c1-c2,d1,d2
6	Final Exam (theoretical)	16	40	50%	a1-a3,b1-b3,d1,d2,
7	Final Exam (practical)	15	20	20%	b1-b3,c1-c2,d1,d2
	Total		100	100%	

VII- Learning Resources:

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

1- Cotran RS, Kumar V , Collin T, Robbins SL, (2020), Robbins Pathologic Basis of Disease: 10th edition, , W.B.Sunders Co. Philadelphia, London, Toronto, Montreal, Sydney, Tokyo

2- Essential References.

1- Simon Herrington. C (2020), Muir's Textbook of Pathology,CRC Press,SBN 9780367146726.
2- Alasdair D.T. Govan, R. MacFarlane (Editor). Pathology Illustrated. Last edition . Chur Livingstone. ISBN-10: 044305956X

3- Electronic Materials and Web Sites *etc.*	
	www.webpathology.com www.webpathology.com http://www.afip.org/consultation/vetpath/index.htm http://web.vet.cornell.edu/public/oed/neuropathology/index.asp Other learning material such as computer-based programs/CD, professional standards/regulations Other learning material such as computer-based programs/CD, professional standards/regulations

VIII- Course Policies:

١	Class Attendance: Absence from lectures and/or tutorials shall not exceed 25%. Students who exceed the 25% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college shall not be allowed to take the final examination and shall receive a mark of zero for the course. -
٢	Tardy: Students should be attending the classes, as it has required for the assessments if the student is 15 minutes late in attending to the class for more than two classes he will loss 50% of quizzes mark -
٣	Exam Attendance/Punctuality: All examination and their roles will be according to Students affairs regulations -
٤	Assignments & Projects: Student, who is submitting the assignments or the projects on time, will be awarded good percentage in grading of participation.
٥	Cheating: All students must be an ideal behavior, respect each other, their teachers, and respect the roles of the colleague. In addition, students should follow safety roles while working in the lab. Those who has been caught in any cheating case will be punished according to the Students affairs regulations -

6	Plagiarism: Student will be punished depend upon gravity of the action and according to Students affairs regulations which might be ranged from rewriting the homework to suspension or dismissal
7	Other policies: Using mobile or another electronic device capable to store or transfer data in class during the lecture or the exam is forbidden. -

Microbiology II (pharmaceutical Microbiology)

I. Course Identification and General Information:

1	**Course Title:**	**Pharmaceutical Microbiology II**				
2	**Course Code &Number:**	*PH1123124*				
3	**Credit hours: 3**	C.H				Total
		Th.	Seminar	Pr.	Tr.	
		2		1		3
4	**Study level/ semester at which this course is offered:**	*3rd Level/1st semester*				
5	**Pre –requisite (if any):**					
6	**Co –requisite (if any):**					
7	**Program (s) in which the course is offered:**	**Bachelor of Pharmacy**				
8	**Language of teaching the course:**	**English**				
9	**Location of teaching the course:**	**Thamar University – Faculty of Medical Sciences**				
10	**Prepared By:**	**Dr. Abdulrahman Al-Haifi**				
11	**Date of Approval**	**2021**				

II. Course Description:

This Course designed to teach Pharmacy students how to perform the antimicrobial testing using the various methods of antimicrobial evaluation as disc agar diffusion, MIC, MBC determination, Sterility testing of Pharmaceutical preparations, and evaluation of efficacy of pharmaceutical preservation, vaccine preparation and mods of vaccination.

III. Course Objectives:

The overall aims of the course are:

1. To provide the student with knowledge of the concept of sterilization, disinfection, antisepsis and preservation.

2. To enable the students to understand for the different chemical and physical methods used to control microbial contamination.
3. To provide the students with skills for the methods used for the evaluation of antimicrobial efficacy and factors affecting it.

IV. Course Intended Learning Outcomes (CILOs) :

Knowledge and Understanding:

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

Knowledge and Understanding PILOs		Knowledge and Understanding CILOs
After completing this program, students would be able to:		**After completing this course, students would be able to:**
A1		a1 Know the meaning of disinfection, antisepsis, preservation process, bactericidal, bacteriostatic and chemical sterility. a2 Classify the antimicrobials including mechanism of action, therapeutic uses, dosage, contraindications, adverse drug reactions and drug interactions. a3 Know the different in vitro tests used to evaluate the efficacy, the potency and the capacity of different antimicrobials
A2		
A3		
A4		
A5		

Intellectual Skills :

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

Intellectual Skills PILOs		Intellectual Skills CILOs
After completing this program, students would be able to:		After completing this course, students would be able to:
B1		b1 Interpret the results of the different tests used to evaluate the antimicrobial efficacy b2 Deduce the appropriate sterilization procedure for certain object b3 Determine clinical features an LAB tests for different infections.
B2		
B3		
B4		

Professional and Practical Skills

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

c1 Perform laboratory experiments, and evaluate the results in a laboratory report.
c2 able to cultivate bacteria and measure antibiotic activities.
c3 applies appropriate methods and techniques in assessing the antimicrobial agents.

Professional and Practical Skills PILOs		Professional and Practical Skills CILOs
After completing this program, students would be able to:		After completing this course, students would be able to:
C1		c1 Design a suitable testing method to evaluate a bacteriostatic and bactericidal agents c2 Work out a suitable biochemical tests to identification of different microorganisms
C2		
C3		
C4		
C5		

Transferable (General) Skills :		
Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)		
Transferable (General) Skills PILOs		**Transferable (General) Skills CILOs**
After completing this program, students would be able to:		**After completing this course, students would be able to:**
D1		d1 Communicate effectively with the drug manufacturing bodies concerning GMP for microbial quality monitoring & aseptic manufacturing
D2		
D3		
D4		

V. Alignment Course Intended Learning Outcomes

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
a1	a1 Know the meaning of disinfection, antisepsis, preservation process, bactericidal, bacteriostatic and chemical sterilants.	- Lectures - Discussion Sessions - Assignments	- Periodic exam (Quizzes) - Evaluate assignments - Mid & final exam
a2	a2 Classify the antimicrobials including mechanism of action, therapeutic uses, dosage, contraindications, adverse drug reactions and drug interactions.		
a3	a3 Know the different in vitro tests used to evaluate the efficacy, the potency and the capacity of different antimicrobials		

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies

b1	b1 Interpret the results of the different tests used to evaluate the antimicrobial efficacy b2 Deduce the appropriate sterilization procedure for certain object	- Discussion Sessions - Problem solving - Group discussion - Assignments	- Oral presentations - Evaluate assignments - Mid & final exam
b2	b3 Determine clinical features an LAB tests for different infections		
b3	b1 Interpret the results of the different tests used to evaluate the antimicrobial efficacy b2 Deduce the appropriate sterilization procedure for certain object		

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

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
c1	c1 Design a suitable testing method to evaluate a bacteriostatic and bactericidal agents	- Discussion sessions - Assignments	- Oral presentations - Theory & Practical exams - LAB report - Evaluate assignments
c2	c2 Work out a suitable biochemical tests to identification of different microorganisms		

(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 with the drug manufacturing bodies concerning GMP for microbial quality monitoring & aseptic manufacturing	- Discussion Sessions - Assignments that require collecting information from the internet.	- Oral presentations - Writing

VI. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	**Introduction to chemotherapeutic agents**	- History and development of chemotherapeutic agent, Properties of antimicrobial agents. - Types of chemotherapeutic agents - Synthetic, Semisynthetic, Natural. - Antibiotics: Types of antibiotics with their mode of action. - Antibacterial, antifungal - Antiviral, antiprotozoal	3	6	
2	**Antibiotic resistance and development of new therapeutics**	- Development of antibiotic resistance, Mechanism of antibiotic resistance, - Antimicrobial Peptides: History, properties, sources, mode of action, application. - Phage therapy: introduction to phages, lytic cycle, types of phages involved in phage therapy - Plant based therapeutic agents.	3	6	
3	**Sterilization and Microbial spoilage of pharmaceutical products**	- Microbial contamination spoilage and hazard: Sources of contamination, factors affecting survival and growth, breakdown of active ingredient and general formulations. - Principles of sterilizations with respect to pharmaceutical industries. - Methods of sterilizations: Steam, dry heat, Radiation, Gaseous and Filtration	3	6	
4	Antibiotics & Preservation of Pharmaceutical Products	- Type of antibiotics and their methods of actions MIC, MBC - Principles of preservation: objectives of preservation, the ideal preservative, rational development of a product preservative system etc. - Antimicrobial preservatives and their properties: antimicrobial activity, factors affecting antimicrobial activity, preservative monographs.	3	4	

		- Preservative stability and efficacy. Methods of Preservative evaluation and testing			
	Vaccination	- Introduction Definition Type of vaccines Mechanism of action Preparation & preservation of vaccines.	2	4	
Number of Weeks /and Units Per Semester			**14**	**28**	

B – Case Studies and Practical Aspect: (if any)

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	- Screening of antibiotic producers-crowded plate technique	2	4	
2	- Determination of effective dilution of the given disinfectant to disinfect tables & vessels	2	4	
3	- Determination of effective dilution of the given disinfectant for effective disinfection of skin	2	4	
4	- Determination of preservative effect of the given preservative	2	4	
5	- Determination of	3	6	

	antibiotic Sensitivity for the given bacteria by plate and tube methods.			
6	Revision	**1**	**2**	
Number of Weeks /and Units Per Semester		**12**	**24**	

VII. Teaching strategies of the course:

- Lectures
- Discussion sessions
- LAB Class
- Media Presentations: Power Point, Video
- Assignments
- Solving of problems

VIII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Class attendance and participation	**a1-a3, b1, b2, c1, d1,**	weekly	2.5
2	Homework, presentation	**a1, a2, b1, b2, c1, d1.**	11	2.5

IX. 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		1-14	5	**5%**	a1,b1,b2,c1, a2, d1
2	Quizzes 1		**6**	**2.5**	**2.5%**	a1,a2, c1,b1
3	Mid-semester exam of theoretical part (written exam		**8**	**10**	**10%**	a1,a2,b1,b3, c1, d1
	Quizzes 2		**12**	**2.5**	**2.5%**	a2, b1, b2, c1, d1,
4	Lab. Term works	Attitude	1-11	5	**5%**	c1-c2,d1,
5		Accomplishments		5	**5%**	
6	Final exam (practical)		12	20	20**%**	c1, c2,d1,
7	Final exam of theoretical part (written exam)		16	50	f0**%**	a1-a3,b1-b3,c1, d1
Total				100	100%	

X. Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

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

1) Pharmaceutical Microbiology – Edt. by W.B.Hugo & A.D.Russell Sixth edition. Blackwell scientific Publications

2- Essential References.

1) Prescott's Microbiology 8th Edition by Willey, Joanne, Sherwood, Linda, Woolverton, Chris
2) Pharmaceutical Microbiology by Ashutosh Kar

3- Electronic Materials and Web Sites *etc*.

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Council of Academic Accreditation & Quality Assurance of Higher Education (CAQA)

مركز التطوير الأكاديمي وضمان الجودة
Center of Academic Development and Quality Assurance

Faculty of Medical Sciences

Department of Pharmacy

Program of Bachelors Pharmacy

Course Specification of Pharmaceutics II Course Code. (PH1123172)

2024

T4: This Template is Developed and Approved by CAQA-Yemen, 2023

I. Course Identification and General Information:

1	**Course Title:**	**Pharmaceutics II**				
2	**Course Code & Number:**	**PH1123172**				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		*1*		*3*
4	**Study level/ semester at which this course is offered:**	*3rd level/ 1st semester*				
5	**Pre –requisite (if any):**	*Pharmaceutics I*				
6	**Co –requisite (if any):**					
7	**Program (s) in which the course is offered:**	*Bachelor of Pharmacy*				
8	**Language of teaching the course:**	*English*				
9	**Study System**	*Semester*				
10	**Mode of delivery:**	*Regular*				
11	**Location of teaching the course:**	*Faculty of Medical Sciences, Themar University*				
12	**Prepared By:**	*Dr. Abdulkarim Kassem Alzomor*				
13	**Date of Approval**					

II. Course Description:

This course is the second part of "Pharmaceutics" courses that are intended to provide knowledge and skills in designing pharmaceutical dosage forms. It deals with designing of compressed gases (pharmaceutical aerosols), semisolid dosage forms and suppositories.

III. Intended learning outcomes (ILOs)

Course Intended Learning Outcomes		Program Intended Learning Outcomes	
a1	Describe the stages of designing pharmaceutical aerosols, semisolid preparations and suppositories.	**A1**	knows the basic principles of pharmaceutical, medical, health & environmental sciences, as well as, pharmaceutical calculations.
a2	Explicit the general properties, the types and roles of excipients, advantages and disadvantages of pharmaceutical aerosols, semisolid and suppositories dosage forms**.**	**A2**	Sufficiently knows of the analytical & biotechnical techniques, necessary for isolation, refinement, analysis& titration& manufacturing of pharmaceutical substances & preparations
b1	Classify pharmaceutical aerosols, semisolid preparations and suppositories.	**B2**	Accurately suggests of the correct choice of the drug treatment for various disease conditions according to the foundations of pharmacological therapy
b2	Design pharmaceutical aerosols, semisolid preparations and suppositories.	**B4**	properly Innovates of pharmaceutical products & evaluates them on the scientific bases.
c1	Handle efficiently and safely the chemical materials and tools used in the laboratory.	**C2**	Applies the concepts of pharmacovigilance in the dispensing and the preparation, storage and distribution of medicines safely and effectively
c2	Operate the instruments and prepare extemporaneous semisolid preparations and suppositories.	**C4**	Efficiently operates, the different technologies and equipment in the area of pharmacy
d1	Participate efficiently with colleagues in a team work	**D1**	Works effectively in a unique team
d2	Communicate effectively and behave in discipline with colleagues.	**D4**	Resides excellent relationships with the patients & related healthcare directions.

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Describe the stages of designing	- Lectures and Groups	Quizzes, Written exam.

pharmaceutical aerosols, semisolid preparations and suppositories. a2. Explicit the general properties, the types and roles of excipients, advantages and disadvantages of pharmaceutical aerosols, semisolid and suppositories dosage forms.	discussion. - Practical presentations - Self - learning.	

(B) Alignment Course Intended Learning Outcomes 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. b2. Design pharmaceutical aerosols, semisolid preparations and suppositories.	- Discussions and Training - Field visits - Problem solving	- Quizzes, Homework - Observation - Task's Evaluates

(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 laboratory. c2. Operate the instruments and prepare extemporaneous semisolid preparations and suppositories.	- Discussions and Training - Field visits - Problem solving	- Quizzes, Homework - Observation - Task's Evaluates

(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	- Group discussions	- Homework

in discipline with colleagues. d2. Participate efficiently with colleagues in a team work.	- Cooperative learning. - Self – learning - Inductive and deductive	- Evaluates of Oral Presentation

IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1	**Pharmaceutical aerosols**	a1, a2, b1, b2, d1	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, b1, b2, d2	• **introduction:** definitions , advantages, disadvantages, types, anatomical features and targets of the skin, Factors effect on drug absorption from the skin • Classification of semisolid preparation	1	2
3	**Semisolid dosage forms :** **(2)Ointments and pastes**	a1, a2, b1, b2, d1	• **ointments** (definitions, advantages, advantages, disadvantages, classification based on type of ointment base,	4	

			formulation considerations, method of preparation) • **Pastes:** (definitions, advantages, advantages, disadvantages, classification based on type of ointment base,		8
4	Mid-term Exam			1	2
5	**Semisolid dosage forms (3) Creams and gels**	a1, a2, b1, b2, c1, d1	• **Creams** (definitions, advantages, advantages, disadvantages, classification, formulation considerations, method of preparation • **Gels** (definitions, advantages, classification, formulation , considerations, method of preparation	3	6
6	**Suppositories**	a1, a2, b1, b2, d2	definitions, advantages, advantages, disadvantages, classification (rectal, vaginal) formulation, types of suppository bases, method of preparation	3	6
7	**Course Review**	a1, a2, b1, b2, d1, d2	Review of the course topics by discussion session.	1	2
8	FINAL - EXAM			1	2
Number of Weeks /and Units Per Semester				**17**	**34**

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**	c1,c2, , d1, d2
2.	Preparation of salicylic acid	**1**	**2**	c1,c2, , d1, d2

	2 % ointment in simple ointment base			
3.	Preparation of hydrophilic ointment USP	**1**	**2**	c1,c2, , d1, d2
4.	Preparation of Polyethylene glycol ointment base.	**1**	**2**	c1,c2, , d1, d2
5.	Preparation of o/ w creams: vanishing cream base	**1**	**2**	c1,c2, , d1, d2
6.	Preparation of w/o creams: cold cream base	**1**	**2**	c1,c2, , d1, d2
7.	Preparation of hydrophilic gel base : Carbomer or Carboxymethyl cellulose gel	**1**	**2**	c1,c2, , d1, d2
8.	Preparation of Aspirin in cocoa butter base suppositories.	**1**	**2**	c1,c2, , d1, d2
9.	Preparation of Glycerin suppositories.	**1**	**2**	c1,c2, , d1, d2
10.	Preparation of thiobroma oil suppositories.	**1**	**2**	c1,c2, , d1, d2
11.	Preparation of Emo-gel	**1**	**2**	c1, c2, , d1, d2
12	PRACTICAL EXAM	**1**	**2**	c1, c2, , d1, d2
Number of Weeks /and Units Per Semester		**12**	**24**	

V. Teaching strategies of the course:

- Lectures
- Groups discussion.
- Discussions and Training
- Practical presentations
- Field visits
- Problem solving
- Practical in Lab
- Cooperative learning.
- Simulation Group discussions
- Self – learning

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Class attendance and participation	**a1, a2, b1, b2, c1,c2 d1, d2**	weekly	2.5
2	Homework, presentation	**a1, a2, b1, b2, c1,c2 d1.**	11	2.5

VII. 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		1-14	5	**5%**	**a1,b1,b2,c1, a2, d1,d2**
2	Quizzes 1		**6**	**2.5**	**2.5%**	**a1,a2, c1,b1**
3	Mid-semester exam of theoretical part (written exam		**8**	**20**	**20%**	**a1,a2,b1,c1, d1,d2**
	Quizzes 2		**12**	**2.5**	**2.5%**	**a2, b1, b2, c1, d1, d2**
4	Lab. Term works	Attitude	1-12	5	**5%**	**c1, c2,d1,d2**
5		Accomplishments		5	**5%**	
6	Final exam (practical)		12	20	20%	**c1, c2,d1,d2**
7	Final exam of theoretical part (written exam)		17	40	40%	**a1,a2,b1,b2,c1, d1,d2**
Total				100	100%	

VIII. Learning Resources

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

1. Aulton M.E., Pharmaceutics: the science of dosage form design, 2002, Churchill Livingstone, UK
2. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA.

2- Essential References.

1. Williams and Wilkins (2005). Remington; the Science and Practice of Pharmacy (2first edition). Publisher: Lippincott.
2. .Patrick J. Sinko (2006). Martin's Physical Pharmacy and Pharmaceutical Sciences.

3- Electronic Materials and Web Sites *etc*.

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.

Faculty of Medical Sciences

Department of Pharmacy

Program of Bachelors Pharmacy

Course Plan (Syllabus) of Pharmaceutics II Course Code. PH1123172

I. Information about Faculty Member Responsible for the Course:							
Name of Faculty Member:		Office Hours					
Location& Telephone No.:	-----						
E-mail:	--@--.--	SAT	SUN	MON	TUE	WED	THU

2024

I. Course Identification and General Information:							
1-	**Course Title:**	*Pharmaceutics II*					
2-	**Course Number & Code:**	**PH1123172**					
3-	**Credit hours:**	**C.H**				**Total**	
		Th.	**Seminar**	**Pr.**	**F. Tr.**		
		2		1		**3**	
4-	**Study level/year at which this course is offered:**	*3rd level/ 1st semester*					
5-	**Pre –requisite (if any):**	*Pharmaceutics I*					
6-	**Co –requisite (if any):**						
7-	**Program (s) in which the course is offered**	*General Pharmacy and PharmD*					
8-	**Language of teaching the course:**	*English /Arabic*					
9-	**System of Study:**	*Semester*					
10-	**Mode of delivery:**	*Regular*					
11-	**Location of teaching the course:**	*Themar University campus*					

II. Course Description:

This course is the second part of "Pharmaceutics "courses that are intended to provide knowledge and skills in designing pharmaceutical dosage forms. It deals with designing of compressed gases (pharmaceutical aerosols), semisolid dosage forms and suppositories.

III. Intended learning outcomes (ILOs) of the course:

- Brief summary of the knowledge or skill the course is intended to develop:

1. Describe the stages of designing pharmaceutical aerosols, semisolid preparations and suppositories.
2. Explicit the general properties, the types and roles of excipients, advantages and disadvantages of pharmaceutical aerosols, semisolid and suppositories dosage forms.
3. Classify pharmaceutical aerosols, semisolid preparations and suppositories.
4. Design pharmaceutical aerosols, semisolid preparations and suppositories.
5. Handle efficiently and safely the chemical materials and tools used in the laboratory
6. Operate the instruments and prepare extemporaneous semisolid preparations and suppositories.
7. Communicate effectively and behave in discipline with colleagues.
8. Participate efficiently with colleagues in a team work.

IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours
1	**Pharmaceutical aerosols**	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**	• **introduction:** definitions , advantages, disadvantages, types, anatomical features and targets of the skin, Factors effect on drug absorption from the skin • Classification of semisolid preparation	1	2

3	**Semisolid dosage forms : (2)Ointments and pastes**	• **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
4	Mid-term Exam		1	2
5	**Semisolid dosage forms (3) Creams and gels**	• **Creams** (definitions, advantages, advantages, disadvantages, classification, formulation considerations, method of preparation • **Gels** (definitions, advantages, classification, formulation **,** considerations, method of preparation	3	6
6	**Suppositories**	definitions, advantages, advantages, disadvantages, classification (rectal, vaginal) formulation, types of suppository bases, method of preparation	3	6
7	**Course Review**	Review of the course topics by discussion session.	1	2
8	FINAL - EXAM		1	2
Number of Weeks /and Units Per Semester			**17**	**34**

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours
1	Pharmaceutical aerosols: construction and use	1	2
2	Preparation of salicylic acid 2 % ointment in simple ointment base	1	2
3	Preparation of hydrophilic ointment USP	1	2
4	Preparation of Polyethylene glycol ointment base.	1	2

5	Preparation of o/ w creams: vanishing cream base	**1**	**2**
6	Preparation of w/o creams: cold cream base	**1**	**2**
7	Preparation of hydrophilic gel base : Carbomer or Carboxymethyl cellulose gel	**1**	**2**
8	Preparation of Aspirin in cocoa butter base suppositories.	**1**	**2**
9	Preparation of Glycerin suppositories.	**1**	**2**
10	Preparation of thiobroma oil suppositories.	**1**	**2**
11	Preparation of Emo-gel	**1**	**2**
12	PRACTICAL EXAM	**1**	**2**
Number of Weeks /and Units Per Semester		**12**	**24**

V. Teaching strategies of the course:

- Lectures
- Groups discussion.
- Discussions and Training
- Practical presentations
- Field visits
- Problem solving
- Practical in Lab
- Cooperative learning.
- Simulation Group discussions
- Self – learning
- Inductive and deductive

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Class attendance and participation	weekly	2.5	2.5
2	Homework, presentation	11	2.5	2.5

VII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method		Week Due	Mark	Proportion of Final Assessment
1	Assignments		1-16	5	**5%**
2	Quizzes 1		**6**	**2.5**	**2.5%**
3	Mid-semester exam of theoretical part (written exam		**8**	**20**	**20%**
	Quizzes 2		**12**	**2.5**	**2.5%**
4	Lab. Term works	Attitude	1-12	5	**5%**
5		Accomplishments		5	**5%**
6	Final exam (practical)		12	20	20%
7	Final exam of theoretical part (written exam)		17	40	40%
Total				100	100%

IX. Learning Resources

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

1. Aulton M.E., Pharmaceutics: the science of dosage form design, 2002, Churchill Livingstone, UK
2. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA.

2- Essential References.

1. Williams and Wilkins (2005). Remington; the Science and Practice of Pharmacy (2first edition). Publisher: Lippincott.
2. .Patrick J. Sinko (2006). Martin's Physical Pharmacy and Pharmaceutical Sciences.

3- Electronic Materials and Web Sites *etc*.

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 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.

Biochemistry 2 Course Specification

Faculty: Faculty of Medical Sciences

Program: Laboratory Medicine

I. Course Identification and General Information:

1	**Course Title:**	**Biochemistry 2**				
2	**Course Code &Number:**	*PH1123119*				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		1		3
4	**Study level/ semester at which this course is offered:**	*3rd Level/1st semester*				
5	**Pre –requisite (if any):**					
6	**Co –requisite (if any):**					
7	**Program (s) in which the course is offered:**	**Bachelor of Pharmacy**				
8	**Language of teaching the course:**	**English**				
9	**Location of teaching the course:**	**Thamar university, Faculty of Medical Sciences**				
10	**Prepared By:**	**Dr. Abdulqawi Al-Shammakh**				
11	**Date of Approval**					

II. Course Description:

This course uses the knowledge and understanding gained in the biochemistry1 to provide students w an appreciation and an understanding of key metabolic biochemistry and molecular biology concepts. topics covered include concept of bioenergetics, digestion absorption, transporting and metabolism of carbohydrates, lipids, proteins and nucleic acids. The course enables students to understands metab pathways, tissue specific metabolism and its control and metabolic disorders. The course combines

lectures, tutorials and practical. This practical component focusses on estimation of biomolecules rela to carbohydrate, lipids and proteins and some metabolites associated with metabolic disorders.

III. Course Intended Learning Outcomes (CILOs) :

Knowledge and Understanding:

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

Knowledge and Understanding PILOs	Knowledge and Understanding CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
A1	a1-Explain the basic concept of bioenergetics, metabolic pathways, their integration and regulation.
A1, A3	a2-Describe the processes involved in the metabolism of carbohydrates, proteins, lipids, and nucleic acids.
A2	a3-Discus the principle of chemical tests used in biochemistry laboratory and the factors affecting the accuracy of the results.
A1, A3	a4-Define inborn error of metabolism and determine the enzymes deficient and metabolites changes in different metabolic disorders.

Intellectual Skills:

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

Intellectual Skills PILOs	Intellectual Skills CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
B1, B2	b1-Interpret the laboratory results of lipids carbohydrates and proteins and correlate them with other laboratory findings.
B1	b2-Transform the knowledge gained in

	biochemistry to practical application and understanding human diseases.
B4	b3-Select and asses the best laboratory investigation to verify and interpret the biochemical changes in health and in certain diseases.
B3	b4-Think critically and solve problems related to biochemical investigation.

Professional and Practical Skills	
Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)	
Professional and Practical Skills PILOs	**Professional and Practical Skills CILOs**
After completing this program, students would be able to:	After completing this course, students would be able to:
C1	c1- Apply scientific methods for safety while working in the lab.
C3	c2- Collect, transport and analyze biological samples efficiently.
C4	c3- Perform biochemical tests using standard procedures ensuring producing reliable precise and accurate results.
C6	c4-Use manual and automated instrumentations and show awareness to their calibration and maintenance.

Transferable (General) Skills :	
Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)	
Transferable (General) Skills PILOs	**Transferable (General) Skills CILOs**
After completing this program, students would be able to:	After completing this course, students would be able to:
D5, D7	d1-Respect the ethical role of laboratory medicine and the role of organization.

D3, D4	d2-Acquire skills to use computer and communication technology to develop self-education and continuous long-life learning.
D1	d3-Work independently or in a team as a member or leader.
D2	d4-Communicate effectively with your teacher friends and other faculty staff.

IV. I. Intended learning outcomes (ILOs) of the course:

After completion of this course, the student should be able to:

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1	Explain the basic concept of bioenergetics, metabolic pathways, their integration and regulation.	Active Lectures (supported with discussions), brain storm, tutorial	Written exam, Quiz,
a2	Describe the processes involved in the metabolism of carbohydrates, proteins, lipids, and nucleic acids.	Active Lectures (supported with discussions), tutorial, problem solving.	Written exam, Quiz, homework
a3	Discus the principle of chemical tests used in biochemistry laboratory and the factors affecting the accuracy of the results.	Active Lectures, Tutorial, Animations and videos, Problem solving	Written exam Problem's evaluation , assignment
a4	Define inborn error of metabolism and determine the enzymes deficient and metabolites changes in different metabolic disorders.	Active Lectures (supported with discussions), Case study, tutorial	Written exam Problem's evaluation Quizzes, assignment

(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 laboratory results of lipids carbohydrates and proteins and correlate them with other laboratory findings.	**Problem solving , tutorial, group discussion, laboratory practical**	**Assignment, oral exam, MCQ and lab-report**
b2	Transform the knowledge gained in biochemistry to practical application and understanding human diseases.	**Case study, problem solving, brain storm**	**Assignment, case report, practical exam**
b3	Select and asses the best laboratory investigation to verify and interpret the biochemical changes in health and in certain diseases.	**Laboratory practices, brainstorm, case study**	**Laboratory report Case report, quiz**
b4	Think critically and solve problems related to biochemical investigation.	**Laboratory practices, problem solving**	**Practical exam, case repot**
	(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	Apply scientific methods for safety while working in the lab.	**Laboratory practice, laboratory demonstration, Biosafety work sheet**	**Laboratory report, practical exam, biosafety check-list**
c2	Collect, transport and analyze biological samples efficiently.	**Laboratory practice, laboratory demonstration**	**Laboratory report, practical exam.**
c3	Perform biochemical tests using standard procedures ensuring producing reliable precise and accurate results.	**Laboratory practice, laboratory demonstration**	**Laboratory report, practical exam**
c4	Use manual and automated instrumentations and show awareness to their calibration and maintenance.	**Laboratory practice, animation and videos learning. Field visit**	**Practical exam, laboratory report,**

	(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes		**Teaching strategies**	**Assessment Strategies**
d1	Respect the ethical role of laboratory medicine and the role of organization.	**Laboratory practice, tutorial, group discussion.**	**Lecture and Laboratory attendance,**
d2	Acquire skills to use computer and communication technology to develop self-education and continuous long-life learning.	**Assignment, presentation, electronic learning**	**Seminar, assignment**
d3	Work independently or in a team as a member or leader.	**Seminar, group discussion**	**Assignment report, presentation**
d4	Communicate effectively with your teacher friends and other faculty staff.	**Group discussion, presentation**	**Oral exam, seminar**

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes
1	Introduction to bioenergetic and metabolism	Bioenergetic Types of Chemical reactions, Metabolism definition and characteristics, integration of metabolic pathway	2	4	a1, b1,b2,b3,b4
2	Carbohydrates Metabolism	Digestion and absorption of carbohydrates Metabolism of fructose, galactose and their metabolic disorders, Glycolysis, gluconeogenesis, Pentose phosphate pathway, glycogen biosynthesis and degradation. Krebs cycles. Integration and regulation of metabolic pathways of carbohydrates	3	6	a2, a3,a4 , b1,b2,b3,b4,d2,d3
3	Protein metabolism	Digestion absorption and transport of amino acids, fate of amino acids in the body General catabolic pathway of amino acids, transamination and their role in metabolism of amino acids,	3	6	a2, a3,a4 , b1,b2,b3,b4,d2,d3

		Deamination, transporting and metabolism of ammonia, urea cycle, disorders of ammonia metabolism, inborn error of amino acids metabolism			
	Midterm exam	exam	1	2	a2, a3,a4 , b1,b2,b3,b4,d2,d3
4	Metabolism of lipids	Digestion absorption and transport of lipids, Metabolism of fate in adipose tissue, fatty acids oxidation, ketonbody metabolism, metabolism of lipoproteins, cholesterol and triglyceride biosynthesis, disorders of lipid metabolism	3	6	a2, a3,a4 , b1,b2,b3,b4,d2,d3
5	Metabolism of nucleic acids	Digestion of nucleic acids, metabolism of purine and pyrimidine, salvage pathway for purine and pyrimidine, uric acid and disorders of nucleotides metabolism	1	2	a2, a3,a4 , b1,b2,b3,b4,d2,d3
6	Hemoglobin and heme metabolism	Heme biosynthesis, heme catabolism, porphyrias. Bilirubin transport conjugation and excretion	2	4	a2, a3,a4 , b1,b2,b3,b4,d2,d3
	Final exam		1	2	a1,a2,a3,a4, b1,b,b3, b4, d2,d3
Number of Weeks /and Units Per Semester			16	32	

B - Practical Aspect: (if any)

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	Estimation of serum glucose, oral glucose tolerance test	2	4	c1, c2,c3, c4 , b2,b3,b4, d1,d2,d3,d4
2	Estimation of plasma proteins	2	4	c1, c2,c3, c4 , b2,b3,b4, d1,d2,d3
3	Urea, creatinine and uric acids	2	4	c1, c2,c3, c4 , b2,b3,b4, d1,d2,d3
4	Midterm exam	1	2	c1, c2,c3, c4 , b2,b3,b4, d1,d2,d3
5	Estimation of lipids profiles	2	4	c1, c2,c3, c4, b2,b3,b4, d1,d2,d3
6	Determination of urine ph and electrolytes	2	4	c1, c2,c3, c4 , b2,b3,b4, d1,d2,d3,d4
7	Estimation of transaminases	2	4	c1, c2,c3, c4 , b2,b3,b4, d1,d2,d3,d4
8	Final exam	1	2	c1, c2,c3, c4 , b2,b3,b4, d1,d2,d3,d4
Number of Weeks /and Units Per Semester		14	28	

IV- Teaching strategies of the course:

Lectures, Group discussions and Tutorials

Lectures using data show, Group discussions and Tutorials, workshop, analyzing and problem-solving methods. Laboratory work, directed reading, independent study and discussion

V- Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Seminar	b2,, d2,d4	6	2
3	Presentation	b2, d2,d4	8	3

VI- Schedule of Assessment Tasks for Students During the Semester:

8	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
	Seminar	9, 11	2	2%	b2, d2,d4
	Presentation and assignment	5, 12	3	3%	b2, d2,d4,
1	oral		5	5%	b2,d2,d4
2	Midterm practical exam	6	10	10%	c1, c2,c3, c4 , b2,b3,b4, d1,d2,d3
3	Mid-Term Theoretical Exam	9	10	10%	a2, a3,a4 , b1,b2,b3,b4,d2,d3
4	Logbook(Practical report)		10	10 %	c1-c4, b3
5	Final Practical Exam	13	20	20 %	c1,c2,c4,b3,b4, d1,d3
6	Final theoretical exam	16	40	40%	a1-a4,b1, b2,b4
7	Total		100	100 %	a2, a3,a4 , b1,b2,b3,b4,d2,d3

VII- Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

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

1- D M Vasudevan, (2019),Text book of Biochemistry for Medical Student, 9th edition Jaypee Publishers, India
2- Satyanarayana U, (2019),Biochemistry,5th edition, Generic Publisher. India

2- Essential References.

1- Lieberman and Marks's,(2017) Marks' Basic Medical Biochemistry: A Clinical Approach, 5th edi USA, Wolters Kluwer Health.
2- Wilma D Silvia (2020), Competency Based Practical Biochemistry Textbook, 2nd edition, Paras Medical Publisher. India
3- David L. Nelson; Michael M. Cox, (2021), Lehninger Principles of Biochemistry, 8th edition.

3- Electronic Materials and Web Sites *etc*.

1-http://highered.mcgraw-hill.com/sites/0072495855/student_view0/

2.http://www.worthington-biochem.com/index/manual.html

3.https://blog.feedspot.com/biochemistry_blogs/

4. http://www.csun.edu/~hcchm001/biosites.htm

5. http://www.gwu.edu/~mpb/glycolysis3d.htm

6. https://blog.feedspot.com/biochemistry_blogs/

I. Course Policies:

١	Class Attendance: Absence from lectures and/or tutorials shall not exceed 25%. Students who exceed the 25% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college shall not be allowed to take the final examination and shall receive a mark of zero for the course. -
٢	Tardy: Students should be attending the classes, as it has required for the assessments if the student is 15 minutes late in attending to the class for more than two classes he will loss 50% of quizzes mark -
٣	Exam Attendance/Punctuality: All examination and their roles will be according to Students

	affairs regulations
٤	Assignments & Projects:Student, who is submitting the assignments or the projects on time, will be awarded good percentage in grading of participation.
٥	Cheating: All students must be an ideal behavior, respect each other, their teachers, and respect the roles of the colleague. In addition, students should follow safety roles while working in the lab. Those who has been caught in any cheating case will be punished according to the Students affairs regulations -
6	Plagiarism: Student will be punished depend upon gravity of the action and according to Students affairs regulations which might be ranged from rewriting the homework to suspension or dismissal
7	Other policies:Using mobile or another electronic device capable to store or transfer data in class during the lecture or the exam is forbidden. -

Course Specification of Pharmaceutical Instrumental Analysis

I. Course Identification and General Information:

١	**Course Title:**	**Instrumental Analysis**				
٢	**Course Code &Number:**	**PH1123126**				
٣	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		1		3
٤	**Study level/ semester at which this course is offered:**	3rd level 1st *semester*				
٥	**Pre –requisite:**	**Pharmaceutical Analytical Chemistry II**				
٦	**Co –requisite:**	**No**				
٨	**Program (s) in which the course is offered:**	**Bachelor of Pharmacy**				
٩	**Language of teaching the course:**	**English**				
١٠	**Location of teaching the course:**	**Faculty of Medical Sciences – Thamar University**				
11	**Prepared By:**	**Dr. Olla Sharhan & Dr. Sam Dawbaa**				
12	**Date of Approval**	**2023-2024**				

I. Course Description:

This course deal with the study of introduction to instrumental analysis, Physical methods, Spectrochemical methods, Nuclear Magnetic Resonance (NMR), IR, Mass spectroscopy, Chromatography.
Also, it covers some experiments for quantitative and qualitative determination of some pharmaceutical substances.

II. Aims and Intended learning outcomes (ILOs) of the course:

1. Aims of The Course:

The overall aims of the course are:

- To recognize the basic principles of instrumental analysis.
- To explain physical, spectroscopic and chromatographic method of analysis.
- To illustrate instrumentation and interpretation of spectra obtained from different method
- To check the purity of raw material and quality control of pharmaceutical preparation
- To discuss the advantages and disadvantages of all types of analysis.
- To cover the applications of these methods to pharmaceutical compounds

2. Intended learning outcomes (ILOs) of the course:

A. Knowledge And Understanding:

- **After successful completion the course, students will be able to:**

Program Intended Learning Outcomes (Sub- PILOs)		**Course Intended Learning Outcomes (CILOs)**	
A1 A4		al	Demonstrate knowledge and understanding in the principle of the instrumental methods of analysis including potentiometry and spectroscopic methods; UV-Visible, IR, NMR and Mass spectroscopy.
		a2	**Explain the principle and applications of**

			chromatographic techniques in drugs.

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
a1-	Demonstrate knowledge and understanding in the principle of the instrumental methods of analysis including potentiometry and spectroscopic methods; UV-Visible, IR, NMR and Mass spectroscopy.	• Lectures • Discussion Sessions • Assignments • Video • Trip	• Periodic exam (Quizzes) • Home Assignments • Exams
a2-	Explain the principle and applications of chromatographic techniques in drugs.		

B. Cognitive/Intellectual Skills

- **After successful completion the course, students will be able to**

Program Intended Learning Outcomes (Sub- PILOs)		Course Intended Learning Outcomes (CILOs)	
B2 B4		b1 b2	-Design appropriate methods for evaluation of various chemical and pharmaceutical compounds. - Assess drug interaction through evaluating the validity of the spectrometric methods in the analysis of target compound.

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Design appropriate methods for evaluation of various chemical and pharmaceutical compounds.	• Discussion Sessions • Tutorial • Laboratory Session • Brainstorm	• Oral presentations • Home assignments • Lab report
b2-Assess drug interaction through evaluating the validity of the spectrometric methods in the analysis of target compound**.**		

C. **Practical/Professional Skills**

- **After successful completion the course, students will be able to:**

Program Intended Learning Outcomes (Sub- PILOs)		Course Intended Learning Outcomes (CILOs)	
C1 C2		**c1** **c2** **c3**	- Employ different qualitative and quantitative methods for evaluation and standardization of active substances from different origins. - Usage different techniques for separation of mixture -Handle properly chemicals in the laboratory and be aware of the rules of good laboratory practice (GLP).

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- Employ different qualitative and quantitative methods for evaluation and standardization of active substances from different origins. c2- Usage different techniques for separation of mixture. c3-Handle properly chemicals in the laboratory and be aware of the rules of good laboratory practice (GLP).	• Discussion Sessions • Laboratory practice, laboratory performance, quality control practice	• Oral presentations • Exams • LAB report • Classroom worksheets

D. **General And Key Transferable Skills**

- **After successful completion the course, students will be able to:**

Program Intended Learning Outcomes (Sub- PILOs)		**Course Intended Learning Outcomes (CILOs)**	
D3 D4		d1 d2 d3	-Apply information technology skills, including word processing, database use, archiving data and information retrieval through online computer searches and internet communication. - Manage the time in an analytical work effectively. -Implement writing and presentation skills and acquired long-life learning.

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Apply information technology skills, including word processing, database use, archiving data and information retrieval through online computer searches and internet communication. d2- Manage the time in an analytical work effectively d3- Implement writing and presentation skills and acquired long-life learning	-Electronic learning -Assignments - Laboratory session	- Oral Presentation - Assignments -Homework

III. Course Content:

A. Theoretical Aspect:

	Topic List	Number of Weeks	Contact Hours	ILOs
1	Introduction: Instrumental methods of analysis, advantages and comparison with classical methods of analysis	1	2	a1, b1, b2, d1
2	UV-Visible Spectroscopy: introduction, Factors governing absorption of radiation in the UV/Visible region, instrumentation of spectrometer, Beer- lambert law, single-beam and double-beam spectrophotometers, absorption and intensity shifts, applications in pharmaceutical analysis. -Atomic spectroscopy, Molecular spectroscopy,	٢	٤	a2, d1, d2
3	Fluorescence spectroscopy	1	2	a2, d1, d2
4	-Electroanalytical Methods -Potentiometry & polarography: Reference electrodes: Standard hydrogen electrode, Saturated calomel electrode Indicator electrodes (glass electrode) - Voltametry: Principles & instruments - Conductometry: Principles & instruments -Applications	2	4	b1
5	Infrared Spectroscopy (IR): Principle, methodologies and applications	1	2	a1
6	Midterm exam	1	2	a1
7	NMR: Proton Nuclear Magnetic Resonance Instrumentation, principle and application (^{1}HNMR + ^{13}C NMR)	2	4	a1, b2, d2
8	-Separation methods: distribution law, the distribution ratio, calculations of the percent extracted. - Chromatographic Methods: Basic principle and application Adsorption (liquid–solid) chromatography Partition (liquid–liquid) chromatography Ion-exchange chromatography	1	2	a1, d2
9	Liquid Chromatography: HPLC Instrumentation, principles and applications	2	4	a2
10	Gas Chromatography: GC Instrumentation,	1	2	a2

	principles and applications			
11	Mass spectrometry: Mass-to-Charge Ratio Mass spectrometers	1	2	a2
12	Final exam	1	2	a1, a2, d2
	Total	16	32	

B. Practical Aspect: (if any)

Order	Topics List (Tasks/ Experiments)	Number of Weeks	Contact Hours	ILOs
1	Introduction	1	2	c2
2	UV-Visible Spectrometry; Analysis of Potassium Permanganate Solutions by UV-Vis. Determine the percentage purity of Furosemide tablet by UV	2	2	c1
3	-Determination of λ max of paracetamol solution by UV-Visible - Spectrophotometer identification of unknown compounds using UV	2	4	c2
4	Identification of unknown chemical structures using IR	1	2	c2
5	Identification of unknown chemical structures using IR	1	2	c2
6	NMR Applications: analysis of NMR spectra of unknown compounds	1	2	c2
7	Chromatography: separation of the contents of a mixture of natural products using column chromatography (tomato extract)	1	2	c2
8	Separate and identify the given mixture of sugar by thin layer chromatography	1	2	c2
9	Determine the caffeine and benzoic acid in given sample (soft drink) by HPLC	1	2	c2
10	**Final Exam**	1	2	c2
Number of Weeks /and Units Per Semester		**12**	**24**	

IV. Teaching strategies of the course:

- Lectures using data show, video animation, scientific video
- Search topic and discussion sessions, Solving Problem
- LAB Class

- Media Presentations: Power Point, Video
- Assignments

V. Assignments:

no	Assessment Tasks	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs(symbols)
1	**Participation, quizzes**	Each week	5	5%	a1, a2, b1, c1, d2
2	**Assignments**	6th week	5	5%	a1, a2, b2, c2, d2
3	**Mid – Exam (theoretical)**	7th week	10	10%	a1, a2, a3, b1, b2, d2
4	**Mid – Exam (practical)**	6th week	١٠	10%	c1, c2
5	**Final Exam (practical)**	10th week	20	20%	a1, a2, b1, b2, d2
6	**Final Exam (theoretical)**	14th week	50	50%	a1, a2, b1, b2, d2
	Total		100	100%	

VI. Learning Resources:

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

1. Skoog, D. A., Holler, F. J., & Crouch, S. R. (2007). *Instrumental analysis* (Vol. 47). Belmont: Brooks/Cole, Cengage Learning.
2. Mistry, B. D. (2009). *A handbook of spectroscopic data* (UV, JR, PMR, JJCNMR and Mass Spectroscopy), Oxford Book Company, Jaipur, *Chemistry*, *600*.
3. In addition to the above, the students will be provided with handouts by the lecturer.

2. Recommended Readings and Reference Materials.

- Skoog, D. A., & Donald, M. (2014). *Fundamentals of Analytical Chemistry*, 9th ed. West Sounder's College Publishing, Japan.
- Christian, G. D., Dasgupta, P. K., & Schug, K. A. (2013). *Analytical chemistry*. John Wiley & Sons.

3. Essential References.

1. Ahuja, S., & Jespersen, N. (Eds.). (2006). *Modern instrumental analysis*. Elsevier.
2. Rouessac, F., & Rouessac, A. (2022). *Chemical analysis: modern instrumentation methods and techniques*. John Wiley & Sons.

4. Electronic Materials and Web Sites etc.

- Analytical letters
- Pharmaceutical and biomedical analysis
- Analytical chemistry
- http://www.mediafire.com/download/tfw77m3ewhbte0s/Animation_Spectro_Photomultiplier.mp4
- www.sciencedirect.com

5. Other Learning Material.

- Laboratory instruments and equipment's are needed
- Data show projector

VII. Course Policies:	
١	**Class Attendance:** - Absence from lectures and/or tutorials shall not exceed 25%. Students who exceed the 25% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college shall not be allowed to take the final examination and shall receive a mark of zero for the course.
٢	**Tardy:** - Students should be attending the classes as its required for the assessments if the student is 15 minutes late in attending to the class for more than two classes, he will loss 50% of quizzes mark.
٣	**Exam Attendance/Punctuality:** - All examination and their roles will be according to Students affairs regulations
٤	**Assignments & Projects:** - Student who is submitting the assignments or the projects on time, will be awarded good percentage in grading of participation.
٥	**Cheating**: - All students must be an ideal behavior and respect each other, their teachers and respect the roles of the colleague. In addition, students should follow safety roles while working in the lab. Those who has been caught in any cheating case will be punished according to the students affairs regulations
6	**Plagiarism**: - Student will be punished depend upon gravity of the action and according to Students affairs regulations which might be ranged from rewriting the homework to suspension or dismissal
7	**Other policies:** - Using mobile or another electronic device capable to store or transfer data in class during the lecture or the exam is forbidden.

Course Specification of Phytochemistry I

I. Course Identification and General Information:

١	**Course Title:**	**Phytochemistry I**				
٢	**Course Code &Number:**	*PH1123144*				
٣	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		1		3
٤	**Study level/ semester at which this course is offered:**	**3rd Level/1st semester**				
٥	**Pre –requisite:**	**-**				
٦	**Co –requisite:**	**No**				
٨	**Program (s) in which the course is offered:**	**Bachelor of Pharmacy**				
٩	**Language of teaching the course:**	**English**				
١٠	**Location of teaching the course:**	**Faculty of Medical Sciences – Thamar University**				
11	**Prepared By:**					
12	**Date of Approval**	**2022**				

I. Course Description:

ourse will provide the students with the necessary skills for separation and identification of the active tuents obtained from natural sources (alkaloids – resin and resin combination – bitter principles), the different ds of separation (Chromatography) and then identify these active ingredients either in pure form or a mixture ell as the different methods to evaluate these components and how to deal with the side effects of some nents (if any) and how to overcome it and solve problems. As well as how to deal with poisoning and abuse nces.

II. Aims and Intended learning outcomes (ILOs) of the course:

1. Aims of The Course:

The overall aims of the course are:

1. To provides the students with impart knowledge about important chemical classes of compounds having bio activity.
2. To offer the students with the primary and advanced methods of chromatography that are currently used for isolation, and qualitative and quantitative determination of biologically active compounds.

2. Intended learning outcomes (ILOs) of the course:

A. Knowledge And Understanding:

- **After successful completion the course, students will be able to:**

Program Intended Learning Outcomes (Sub-PILOs)	Course Intended Learning Outcomes (CILOs)

A1 A2 A3		**a1** a2 **a3** a4	**: K**now the principle of pharmaceutical science in the field of chemistry of natural products. : Recognize the physico-chemical properties of drugs (of natural origins) and various substances used in preparation of medicines. **:-**Classify different groups of the active constituents of plant (alkaloids – resin and resin combination – bitter principles) and their uses. : Recognize the proper pharmaceutical and medical terminology and abbreviations in phytochemistry

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
○ **a1- K**now the principle of pharmaceutical science in the field of chemistry of natural products.	• Lectures • Discussion Sessions • Assignments	• Periodic exam (Quizzes) • Home Assignments • Exams
a2- Recognize the physico-chemical properties of drugs (of natural origins) and various substances used in preparation of medicines.		
a3- Classify different groups of the active constituents of plant (alkaloids – resin and resin combination – bitter principles) and their uses		
a4- Recognize the proper pharmaceutical and medical terminology and abbreviations in phytochemistry .		

B. Cognitive/Intellectual Skills

- **After successful completion the course, students will be able to**

Program Intended Learning Outcomes (Sub-PILOs)		Course Intended Learning Outcomes (CILOs)	
B1 B2		**b1** **b2** b3 b4	**:** Select the appropriate methods to separate, identify and estimatethe active substances. **:** Assess drug interaction and adverse drug reactions. : Design appropriate methods for isolation, synthesis, purification, identification and standardization of various chemicals and pharmaceutical compounds (of natural origin). : Interpret experimental data based on relevant principles

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Select the appropriate methods to separate, identify and estimatethe active substances	• Discussion Sessions • Problem solving • Group Discussion	• Oral presentations • Home assignments
b2- Assess drug interaction and adverse drug reactions.		
b3- Design appropriate methods for isolation, synthesis, purification, identification and standardization of various chemicals and		

pharmaceutical compounds (of natural origin).		
b4- Interpret experimental data based on relevant principles		

C. **Practical/Professional Skills**

- **After successful completion the course, students will be able to:**

Program Intended Learning Outcomes (Sub-PILOs)		**Course Intended Learning Outcomes (CILOs)**	
C1 C4		**c1**	**:**Use the appropriate methods for extraction, isolation, synthesis, purification, identification and standardization of active substances from different origins
		c2	**:** Handle properly chemicals in the lab. and be aware of the rules of good laboratory practice.
		c3	:carry out experimental and research studies, including: presentation, analysis and interpretation of the results

©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- Use the appropriate methods for extraction, isolation, synthesis, purification, identification and standardization of active substances from different origins	• Discussion Sessions • Assignments	• Oral presentations • Exams • LAB report
c2- Handle properly chemicals in the lab. and be aware of the rules of good laboratory practice.		
c3- carry out experimental and research studies, including: presentation, analysis and interpretation of the results		

D. **General And Key Transferable Skills**

- **After successful completion the course, students will be able**

Program Intended Learning Outcomes (Sub-PILOs)		**Course Intended Learning Outcomes (CILOs)**	
D1		**d1**	**:** Use information technology skills including word processing and information retrieval through online computer searches in writing a reportabout the chemistry of natural products.

D3 D4		**d2** **d3** **d4**	**:** Acquire independent study skills and problem solving in groups for continuing professional development needs. – Work effectively as a part of a team to perform the required tasks. **:** Manage effectively Time

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Use information technology skills including word processing and information retrieval through online computer searches in writing a reportabout the chemistry of natural products.	• Discussion Sessions • Assignments that require collecting information from the internet.	• Oral presentations • Writing
d2- Acquire independent study skills and problem solving in groups for continuing professional development needs		
d3- Work effectively as a part of a team to perform the required tasks		
d4- Manage effectively Time		

III. Course Content:

A. Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Week	contact hours	ILOs
1	**Introduction**	Methods extraction , isolation identification ,chromatography ,paper chromatography, thin layer chromatography GAS	1	2	a1, a4,b1,b3,d1
2	**Alkaloids**	Definition, type of alkaloids. classification , general properties , extraction , chemical test , pharmacological actions	2	4	a1,a2,a3,b1,b3,b4
3	**Ornithine derived alkaloids**	Tropan alkaloids. Biosynthesis .definition, classification ,chemical test , general properties, uses and action	1	2	a2,a3,b2,b3,d2
4	**Phenylalanine derived alkaloids**	Type of alkaloids. Protoalkaloids. ,general biosynthesis , physicochemical	1	2	a2,b1,b3,b4

		properties , extraction ,isolation , chemical test			
5	**Isoquinoline alkaloids**	Definition , classification .properties ,biosynthesis , pharmacological action	1	2	a2,b2,b3
6	**Plants containing isoquinoline drugs**	Capscicum , opium , ephedra. Kata , ipecac , hydrastis	1	2	a3,a4
7	**Mid-Term**	Mid-Term Exam	1	2	
7	**Troptophan derived alkaloids**	Indol alkaloids , definition , classification , biosynthesis .chemical test. General actions and uses	1	2	a3,a4,b2,b3,d3
8	**Plants containing drugs**	Physostigma, Ergot. Rauwolfia	1	2	a4,
9	**Quinoline alkaloids**	Definition, classification, biosynthesis , properties, chemical test (cinchona bark)	1	2	b3,b4,d3
10	**Pyrolizidine and indolizidine**	Definition , classification. Toxicity, pharmaceutical importance	1	2	b2
11	**Purine and imidazole alkaloids**	Definition, classification, biosynthesis , properties, chemical test plant containing drug ,caffe seed, jaborandi	1	2	a2,b1,b3,d4
12	**Carbohydrates**	Mon-di –tri and polysaccharides , definition , general classification, properties, chemical test	2	4	a2,b4,d4
13	**Final**	Final-Exam	1	2	
Number of Weeks /and Units Per Semester			**16**	**34**	

B. Practical Aspect: (if any)

Order	Tasks/ Experiments	Number of Weeks	contact hours	ILOs
1	Preparation of permanent slides.	1	**2**	c1,
2	Qualitative analysis of unorganized c rude drugs/fibers.	1	**2**	c2,c3
3	Determination of swelling index of mucilage/pectin containing	1	**2**	c1,c3
4	Determination of the Percentage of the(Total Ipecacuanha Alkaloids)	**1**	**2**	c1,c2
5	Separation of Coloured Materials by Column Chromatography.	**1**	**2**	c1,c2
6	Two Dimensional TLC Chromatgraphy The Separation of Ink Pigm	**1**	**2**	c1, c2
7	Mid -term Exam	**1**	**2**	
8	Vinca alkaloids The Identification of Monosaccharides by Paper Chromatography	**1**	**2**	c1,c2
9	The Identification of Monosaccharides by Paper	**1**	**2**	c1

10	Review	**1**	**2**	c2,c3
12	Final - Exam	**1**	**2**	
Number of Weeks /and Units Per Semester		**12**	**24**	

IV. Teaching strategies of the course:

- Lectures
- Search topic and discussion sessions
- LAB Class
- Media Presentations: Power Point, Video
- Assignments

V. Assignments:

no	Assessment Tasks	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs(symbols)
1	**Participation, quizzes**	Each week	5	5%	a1, a2, a4, b1,c1,d3
2	**Research, assignments**	6th week	5	5%	a1, a5, b4, c4, d1,d4
3	**Mid – Exam (theoretical)**	7th week	20	20%	a1.a2,a3, b1,b2, d4
4	**Final Exam (practical)**	15th week	30	30%	a1.a2,a3, b1,b2, d1,d2,d4
5	**Final Exam (theoretical)**	16th week	40	40%	a1.a2,a3, b1,b2, d1,d2, d3
	Total		100	100%	

VI. Learning Resources**:**

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

1. Trease,CE and Evans,WC. Textbook of Pharmacognosy.11th to 14th Editions. Tindal L.U.K.
2. Priciples and Practice of Phytotherapy, Modern Herbal Medicine, Siman
3. Mills, Kerry Bone, Desmond Corrigan, James A. Duke and JanathanV.Wright, Churchill Living Stone (2000).

2. Recommended Readings and Reference Materials.

1. Atal,CK and Kappor,BM.Cultivation and Utilisation of Medicianl Plants.
2. . Wallis,TE. Textbook of Pharmacognosy,5thEdition,J&A,ChurchillLimited,U.K.
3. . Kokate,CKPurohit,AP. And Gokhale,SB.Pharmacognosy.
4. Walis T. A. "Textbook of Pharmacognosy", S. K. Jain for CBS Publishers & Distributors, Jain Bhawan, BholaNath Nagar, Shahdara, Delhi-110032 (India), 5th Edition, 1967, 1985, 1997,2002, 2003, 2004, 2005
5. Chemistry of the Monoterpenes, an Encyclopedia Hand book, Part A & B
6. William F. Erman Marcel Dekker, INC (1985).

3. Essential References.

1. Tyler,VC,Brady,LR and Robers,JE.Pharmacognosy.,11th to 14th Editions;
2. Weiss R.F. and Fintelmann V. " Herbal Medicine", Thieme, Stuttgart, New York, 2nd Ed. (2000).

4. Electronic Materials and Web Sites etc.

- http://www.botanical.com
- http:/www.ansci.cornell.edu/plants/medicinal/

5. Other Learning Material.

- Laboratory instruments and equipments are needed
- Data show projector

VII. Course Policies:	
١	**Class Attendance:** - Absence from lectures and/or tutorials shall not exceed 25%. Students who exceed the 25% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college shall not be allowed to take the final examination and shall receive a mark of zero for the course.
٢	**Tardy:** - Students should be attending the classes as its required for the assessments if the student is 15 minutes late in attending to the class for more than two classes he will loss 50% of quizzes mark.
٣	**Exam Attendance/Punctuality:** - All examination and their roles will be according to Students affairs regulations
٤	**Assignments & Projects:** - Student who is submitting the assignments or the projects on time, will be awarded good percentage in grading of participation.
٥	**Cheating**: - All students must be an ideal behavior and respect each other, their teachers and respect the roles of the colleague. In addition, students should follow safety roles while working in the lab. Those who has been caught in any cheating case will be punished according to the Students affairs regulations
6	**Plagiarism**: - Student will be punished depend upon gravity of the action and according to Students affairs regulations which might be ranged from rewriting the homework to suspension or dismissal
7	**Other policies:** - Using mobile or another electronic device capable to store or transfer data in class during the lecture or the exam is forbidden.

Course Specification

Pharmacology 1

I. Course Identification and General Information:

١	**Course Title:**	**Pharmacology I**				
٢	**Course Code &Number:**	**PH1123151**				
٣	**Credit hours: 3**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2	0	1	0	3
٤	**Study level/ semester at which this course is offered:**	Level 3/ semester1				
٥	**Pre –requisite (if any):**	Physiology				
٦	**Co –requisite (if any):**	None				
٨	**Program (s) in which the course is offered:**	Bachelor of Pharmacy				
٩	**Language of teaching the course:**	English				
١٠	**Location of teaching the course:**	Thamar University - Faculty of Medical Sciences				
11	**Prepared By:**	Dr. Ahmed G. Al- Akydy				
12	**Date of Approval**	2021				

II. Course Description:

The course covers the important concepts that need by student to know about the basis of drug action and the pharmacological basis of therapeutic. The first part of this course deals with general principles of pharmacology, including pharmacokinetics (absorption, distribution, metabolism, and elimination); pharmacodynamics (essentials of drug action, drug-receptor interactions, types of agonist and antagonist, dose -response relationships, therapeutic index, efficacy, and potency), unwanted drug effects, and drug interactions. The second part focuses on systemic pharmacology and involves discussions of the major drug categories as they relate to organ systems or major pathophysiological diseases. This categories

include, drugs acting on the autonomic nervous system (cholinergic, anticholinergic, adrenergic and antiadrenergic drugs) and autacoid drugs .

III. Course Objectives:

The overall aims of the course are:

1. To know the essentials of general pharmacology, drugs dosage forms and types of routes of administrations of drugs and their advantages and disadvantages.
2. To explain the pharmacokinetics (absorption, plasma binding protein, distribution, metabolism, elimination) of drugs.
3. To understand the Pharmacodynamics (mechanism of action & biological actions) of drugs.
4. To recognize the types of drug-drug interactions and drug toxicity.
5. To distinguish the mechanism, uses and side effects of categories of drugs acting on the autonomic nervous system, and autacoid drugs.

IV. Course Intended Learning Outcomes (CILOs) :

Knowledge and Understanding:

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

After completing the course, the student will be able to:

a1: **Understand** in details the basic terms and concepts in general pharmacology, including, pharmacokinetics, pharmacodynamics, adverse effects, and drug – interactions.

a2 **Demonstrate** awareness of the national and international Pharmacovigilance systems

a3: **Describe** the different categories, therapeutic uses, adverse effects and contraindications of drugs affecting autonomic nervous system and autocoids drugs.

Knowledge and Understanding PILOs		Knowledge and Understanding CILOs	
After completing this program, students would be able to:		After completing this course, students would be able to:	
A1	Explain the fundamentals of general sciences and the basic and biomedical sciences and their relations to pharmacy profession.		
A2	Illustrate the fundamentals of social and behavioral sciences relevant to pharmacy, ethics of health care and its impact on their relationship with patients and other healthcare professionals.		
A3	Describe relationships between chemical structure of compounds of pharmaceutical and medicinal interest and biological activities		
A4	Define basic principles of drug: target identification, design, informatics, and mechanisms of action	a1	**Understand** in details the basic terms and concepts in general pharmacology, including, pharmacokinetics, pharmacodynamics, adverse effects, and drug – interactions.
A5	Outline principles of clinical pharmacology, therapeutics and Pharmacovigilance.	a2	**Demonstrate** awareness of the national and international Pharmacovigilance systems

Intellectual Skills :

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

b1 Deduce the importance of knowledge of the basic principles of pharmacokinetics and pharmacodynamics of drugs in safe and efficient practice for pharmacy doctor.

b2 **Categorize** the different classes of drugs affecting of autonomic nervous system and autacoids, in related to their mechanism of action, pharmacological, effects, therapeutic uses, adverse effects and contraindications**.**

b3 **Select** the suitable management strategy, involving the proper dosage form, route of administration, and regimen, for patients in different medical situations relate to disturbances of functions of the autonomic nervous system and autacoid substances.

Intellectual Skills PILOs		Intellectual Skills CILOs	
After completing this program, students would be able to:		After completing this course, students would be able to:	
B1	Classify the synthetic and natural drugs according to their mechanism of action, systemic effect, therapeutic uses, contraindication and toxicity	**b2**	**Categorize** the different classes of drugs affecting of autonomic nervous system and autacoids, in related to their mechanism of action, pharmacological, effects, therapeutic uses, adverse effects and contraindications**.**
B2	Design risk reduction strategies to ensure patient safety and prevent medication errors, drug interaction, and adverse drug effects,		
B3	Solve problems to reduce drug therapy problems		
B4	Select drug therapy regimen using mathematical, genomic, clinical pharmacokinetic and pharmacodynamics principles for optimizing the patient therapy and medication safety	**b1**	**Deduce** the importance of knowledge of the basic principles of pharmacokinetics and pharmacodynamics of drugs in safe and efficient practice for pharmacy doctor.
		b3	**Select** the suitable management strategy, involving the proper dosage form, route of administration, and regimen, for patients in different medical situations relate to disturbances of functions of the autonomic nervous system and autacoid substances.

Professional and Practical Skills

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

c1 **Calculate** the drug dosage using appropriate formulae, and basing on patient's weight, age, health condition, and the suitability the onset and duration of action of a drug**.**

c2 **Administer** the required dose of different drug formulations using proper appropriate route of drug administration, devices and techniques, such as, injections, inhalers, transdermal patches etc.

c3 **Apply** pharmacological principles for rational use of drugs in the management of diseases, that result from disturbances in functions of autonomic nervous system and autacoid substances.

c4 **Detect** and solve problems, such as, side effects and drug interactions, related to drugs acting on autonomic nervous system, and autacoid drugs.

Professional and Practical Skills PILOs		**Professional and Practical Skills CILOs**	
After completing this program, students would be able to:		After completing this course, students would be able to:	
C1	Handle the chemical, biological, and pharmaceutical materials safely		
C2	Operate different pharmaceutical equipment and instruments	c2	**Administer** the required dose of different drug formulations using proper appropriate route of drug administration, devices and techniques, such as, injections, inhalers, transdermal patches etc.
C3	Extract active substances from different sources.		
C4	Carry outpatient physical assessment.	c1	**Calculate** the drug dosage using appropriate formulae, and basing on patient's weight, age, health condition, and the suitability the onset and duration of action of a drug**.**
C5	Advise the patients and health care professionals for optimizing medicines use.	c3	**Apply** pharmacological principles for rational use of drugs in the management of diseases, that result from disturbances in functions of autonomic nervous system and autacoid substances.

Transferable (General) Skills :

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

d1 Work constructively and cooperatively within a team

d2 Communicate effectively orally and writing, with patients and health caregivers

d3 Use information and communication technology to complete assigned tasks

d4 **manage** effectively the time.

Transferable (General) Skills PILOs		Transferable (General) Skills CILOs	
After completing this program, students would be able to:		After completing this course, students would be able to:	
D1	Communicate effectively and ethically with patients, public, and health care professionals.	d2	**Communicate** effectively orally and writing, with patients and health caregivers
D2	Use information systems and computer softwares in order to enhance the delivery of pharmaceutical care,	d3	**Use** information and communication technology to complete assigned tasks
D3	Work effectively individually and in a team	d1	**Work** constructively and cooperatively within a team
D4	Have the skills of decision-making and time management and lifelong learning	d4	**Manage** effectively the time.

V. Alignment Course Intended Learning Outcomes

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
a1	Widely **understand** in details the basic terms and concepts in general pharmacology, including, pharmacokinetics, pharmacodynamics, adverse effects, and drug – interactions.	• Lectures • Discussion Sessions • Assignments	• Periodic exam (Quizzes) • Evaluate assignments • Mid & final exam

a2	**Demonstrate** awareness of the national and international Pharmacovigilance systems		
a3	**Describe** the different categories, therapeutic uses, adverse effects and contraindications of drugs affecting autonomic nervous system and autocoids drugs.		

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

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
b1	**Deduce** the importance of knowledge of the basic principles of pharmacokinetics and pharmacodynamics of drugs in safe and efficient practice for pharmacy doctor.	• Discussion Sessions • Problem solving • Group discussion • Assignments	• Oral presentations • Evaluate assignments • Mid & final exam
b2	**Categorize** the different classes of drugs affecting of autonomic nervous system and autacoids, in related to their mechanism of action, pharmacological, effects, therapeutic uses, adverse effects and contraindications**.**		
b3	**Select** the suitable management strategy, involving the proper dosage form, route of administration, and regimen, for patients in different medical situations relate to disturbances of functions of the autonomic nervous system and autacoid substances.		

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

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
c1	**Calculate** the drug dosage using appropriate formulae, and basing on patient's weight, age, health condition, and the suitability the onset and duration of action of a drug**.**	• Discussion sessions • Assignments	• Oral presentations • Theory & Practical exams • LAB report • Evaluate assignments
c2	**Administer** the required dose of different drug formulations using proper appropriate route of drug administration, devices and techniques, such as, injections, inhalers, transdermal patches etc.		
c3	**Apply** pharmacological principles for rational use of drugs in the management of diseases, that result from disturbances in functions of autonomic nervous system and autacoid substances.		
c4	**Detect** and solve problems, such as, side effects and drug interactions, related to drugs acting on autonomic nervous system, and autacoid drugs.		

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

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
d1	**Work** constructively and cooperatively within a team	• Discussion Sessions • Assignments that require collecting information from the internet.	• Oral presentations • Writing
d2	**Communicate** effectively orally and writing, with patients and health caregivers		
d3	**Use** information and communication technology to complete assigned tasks		
d4	**Manage** effectively the time.		

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	**General principles of Pharmacology**	- Introduction - Definitions - Sources of drug information - Sources of drugs - Drug nomenclature - Drug dosage forms - Routes of drug administration	1W	2	a1; b1; b3; c1; c2; d3;
		- Pharmacokinetics - Drug Absorption - Drug Distribution - Drug Metabolism - Drug Elimination	1W	2	a1; b1; c1; c2; d1; d3
		- Pharmacodynamics - Mechanisms of drug action - Drug receptor interactions - Adverse drug effects	1W	2	a1;a2; b1; c1; c2; d3
2	**Drugs Acting on Autonomic Nervous System (ANS)**	- Introduction to ANS	1W	2	a1; b1; c3; d3
		▪ Parasympathomimetics: - Direct-acting cholinergic agonists - Choline esters. - Natural alkaloids - Indirect-acting cholinergic agonists - Anticholinesterase (AChE) drugs: ✓ Reversible AChE drugs	1W	2	a1; a3; b1; b2; b3; c3;c4; d3

		✓ Irreversible AChE drugs			
		▪ Parasympatholytics**:** - Muscarinic receptor antagonists - Ganglionic blockers - Neuromuscular junction blockers	1W	2	a1; a3; b1; b2; b3; c3;c4; d3
		▪ Adrenergic agonists: - Direct-acting adrenergic agonists - Indirect-acting adrenergic agonists - Mixed-action adrenergic agonists	1W	2	a1; a3; b1; b2; b3; c3;c4; d3
		▪ Adrenergic receptor antagonists: - **Alpha 1- blockers** o Imidazoline derivatives o Beta-haloalkyl amines. o Other alpha α1-blockers - **Alpha 2- antagonists**	1W	2	a1; a3; b1; b2; b3; c3;c4; d3
		▪ Adrenergic receptor antagonists: - **Beta - Blockers** o Non selective- beta blockers o Selective β1- Blockers o α and β antagonists - **Drugs affecting neurotransmitter release or uptake**	1W	2	a1; a3; b1; b2; b3; c3;c4; d3
		- Skeletal muscle relaxants - Drugs for Glaucoma	1W	2	a1; a3; b1; b2; b3; c3;c4; d3
3	**Autacoids**	- The Eicosanoids: Prostaglandins and Leukotrienes & their uses - Platelet activating factor (PAF),bradykinin	1W	2	a1; a3; b1; b2; b3; c3;c4; d3
		- Nonsteroidal antiinflammatory	1W	2	a1; a3; b1;

		drugs (NSAIDs)			b2; b3; c3;c4; d3
		- Histamine and histamine antagonists	1W	2	a1; a3; b1; b2; b3; c3;c4; d3
		- Serotonin agonists & antagonists - Treatment of migraine	1W	2	a1; a3; b1; b2; b3; c3;c4; d3
Number of Weeks /and Units Per Semester			**14**	**28**	

VI. Teaching strategies of the course:

- Lectures
- Discussion sessions
- LAB Class
- Media Presentations: Power Point, Video
- Assignments
- Solving of problems

VII. Assignments:

No	Assignments	Mark	Week Due	Aligned CILOs(symbols)
1	Participation	5	Weekly	a1; a3; b1; b2;c1; c3
2	Quizzes	5	Weekly	a1; a3; b1; b2;c1; c3
3	Research	5	6th W	a1; a3; b1; b2; c1; d1; d3
4	Assignments	5	6th W	a1; a3; b1; b2;c1; d3;d4

5	Mid – Exam (theoretical)	20	7th W	a1; a3; b1; b2;c1c3
	Total score	**40%**		

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 & Homework, Tasks & Presentation	Fortnightly	10	10%	a1; a3; b1; b2;c1; d3;d4
2	Quizzes	W6	5	5%	a1; a3; b1; b2;c1; c3
3	Mid-Term exam	W8	20	20%	a1; a3; b1; b2;c1c3
4	Practical reports	W12	5	5%	a1; b3; c2; c3; d2; d3; d4
6	Final Exam theory	W16	60	60%	a1; a3; b1; b2;c1c3
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).

1) Katzung B.G., Trevor A.J., (2015). Basic & Clinical Pharmacology(13Ed); McGraw-Hill Education, New York.

2) Whalen K.; Feild C., Radhakrishnan R.(2019). Lippincott Illustrated Reviews Pharmacology, (7Ed). Wolters Kluwer, New York.

2- Essential References.

	1) Ritter J.M., Flower R., Henderson G., Loke Y.K., Mac Ewan D. (2020). Rang and Dale's Pharmacology (9 Ed). Elsevier Ltd, United Kingdom. 2) Brunton L.L., Chabner B.A., Knollmann B.C. (2011). Goodman & Gilman's The Pharmacological Basis of Therapeutics (12 Ed). McGraw-Hill companies, Inc. New York.
3- Electronic Materials and Web Sites *etc*.	
	- http://www.jpharmacol.com - http://www.cvpharmacology.com - http://www.fda.gov

Course Specification Community Health

I. Course Identification and General Information:

1	**Course Title:**	Community Health				
2	**Course Code &Number:**	PH1123282				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2				2
4	**Study level/ semester at which this course is offered:**	3rd Level / 2nd semester				
5	**Pre –requisite (if any):**					
6	**Co –requisite (if any):**					
7	**Program (s) in which the course is offered:**	**Bachelor of Pharmacy**				
8	**Language of teaching the course:**	**English**				
9	**Location of teaching the course:**	**Faculty of Medical Sciences, Themar University**				
10	**Prepared By:**	**Dr. Abdulrahman Al-Haifi**				
11	**Date of Approval**	**2021**				

II. Course Description:

This course Introduce the student to the bases and principles of public health that include the definitions of common terminologies and meanings used in public health practice; Health indicators and statistical principles of survey studies; the principles of sanitary environment and ability of identification of environmental hazards

III. Course Objectives:

This course aims to:

1- Develop a graduate who would take a leadership role with other health care members in educating,

motivating, supervising and leading them in health promotion, prevention and control of diseases

2- Prepare a community- oriented physician capable of implementing preventive and control measures for common communicable and non – communicable diseases on the individual, family and community levels and within the primary health care (PHC) setting following MOH policies and protocols.
3- Prepare a graduate who would become an advocate for preventive public health programs and resources
4- Able to determination of the deferent methods can be used from control of this pollutant
5- Suggested the deferent mechanisms for environment protection from the pollutant in her or his environment

IV. Course Intended Learning Outcomes (CILOs):

Knowledge and Understanding:

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

After completing the course, the student will be able to:

Knowledge and Understanding PILOs	Knowledge and Understanding CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
A1	a1 Describe health, disease , spectrum of health and patterns of care a2 Describe major epidemiological study designs, advantages and limitations a3 Describe prevention and control of infection, hospital infection and primary health care.

Intellectual Skills :

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

After completing the course, the student will be able to:

Intellectual Skills PILOs	Intellectual Skills CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
B1	b1 Calculate measures of disease frequency and

	measures of association between risk factors and disease b2 Construct and interpret tables and graphs b3 Identify the dimensions of quality in health care, and how to utilize appropriately quality concepts and processes for performance improvement

Professional and Practical Skills

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

After completing the course, the student will be able to:

Professional and Practical Skills PILOs	Professional and Practical Skills CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
C1	c1 Apply epidemiologic skills in a public health setting, specifically in the formulation or application of public health programs and policies

Transferable (General) Skills :

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

After completing the course, the student will be able to:

Transferable (General) Skills PILOs	Transferable (General) Skills CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
D1	d1 Apply appropriate health education and communication strategies in different settings using behavioral change models d2 Communicate effectively with clients, community members, colleagues from other disciplines

V. Alignment Course Intended Learning Outcomes

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1 Describe health, disease , spectrum of health and patterns of care	- Discussion Sessions - Assignments that require collecting information from the internet	- Writing Exam - Semester activities - Final Exam
a2 Describe major epidemiological study designs, advantages and limitations		
a3 Describe prevention and control of infection, hospital infection and primary health care		

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 Calculate measures of disease frequency and measures of association between risk factors and disease	- lectures (L) - Small group discussion	- Oral presentations - Evaluate assignments - Mid& final exam
b2 Construct and interpret tables and graphs		
b3 Identify the dimensions of quality in health care, and how to utilize appropriately quality concepts and processes for performance improvement		

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 Apply epidemiologic skills in a public health setting, specifically in the formulation or application of public health programs and policies	- Solving of some clinical cases. - Presentations	- Oral presentations - Midterm exams - Semester activities

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1 Apply appropriate health education and communication strategies in different settings using behavioral change models	- Discussion Sessions - Assignments that require collecting information from the internet	- Oral presentations - Semester activities
d2 Communicate effectively with clients, community members, colleagues from other disciplines		

VI. Course Content:

A. **Theoretical Aspect:**

No	Topics List	Sub Topics List	No Of Weeks	Contact Hours	ILOS
1	**Public health**	Concept of health, public health, environment and environmental health.	1	2	a1, a3, b1, c1
2	**Determinations of health**	Hereditary, environment, life style, socio and economic condition, health and family and family welfare services.	1	2	a1, a2 b3, c1
3	**Personal hygiene**	Clothing, clean lines, physical exercise, rest and sleep, health sitting, and reading. Miscellaneous: food and drink, constipation, and habits.	2	4	a1, a3, b3, c1
4	**Safe water supply**	Water sources, water pollution, and purification of water.	1	2	a1, b2,
5	**Air pollution**	Sources, prevention and control of air pollution.	1	2	a1-a3 b2,b3

6	**Waste disposal**	Solid wastes, excrete disposal, Sanitary principle, methods of disposal, soil, noise, radiation, and food pollution.	2	4	a4-a3, b2,b3, c1
7	**Housing**	Indicators of mortality and morbidity. Disability rate.	1	2	a1, b2
8	**Epidemiology of infectious diseases**	Definition of infection, methods of infections. Definitions of diseases, types of diseases, epidemic , endemic, pandemic,	2	4	a1-a3 b1-b3
9	**School and hospital health**	Diseases effect on schoolchildren, & community acquired infections. Hospital acquired infections.	1	2	a1, b4,c1, d1, d2
10	**Prevention communicable diseases**	Prevention and control of major communicable diseases in Yemen.	1	2	a1, a3, b3, c1, d1-d2
11	**Vaccination.**	Live attenuated vaccine Killed vaccine	1	2	a1-a3, b1-b3 ,c1, d2
Number of Weeks /and Units Per Semester			**14**	**28**	

VII. Teaching strategies of the course:

- Lectures
- Discussion sessions
- Media Presentations: Power Point, Video
- Assignments
- Solving of problems

VIII. Assignments:

No	Assignments	Mark	Week Due	Aligned CILOs(symbols)
1	Participation	2.5	Weekly	
2	Quizzes	2.5	Weekly	
3	Research	2.5	6th W	
4	Assignments	2.5	6th W	
5	Mid – Exam (theoretical)	30	7th W	
	Total score	**40%**		

IX.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 & Homework, Tasks & Presentation	Fortnightly	7.5	7.5%	a1; a2; a3; b1; b2;c1; d2
2	Quizzes	W6	2.5	2.5%	a1; a2; a3; b1; b2;c1

3	Mid-Term exam	W8	30	30%	a1; a2; a3; b1; b2; c1
4	Final Exam theory	W16	60	60%	a1; a2; a3; b1; b2;c1
Total			**100**	**100%**	

X. Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

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

1. Pollution and environment protection, third Edition, Mohammed al-aodat,1998.

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2- Essential References.

1. Environmental Pollution, first Edition, Mothana al-omar, 2000

3- Electronic Materials and Web Sites *etc*.

Faculty of Medical Sciences

Course Specification of Parasitology

I. Course Identification and General Information:

١	**Course Title:**	**Parasitology**				
٢	**Course Code & Number:**	PH1123227				
٣	**Credit hours: 3**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		`1		3
٤	**Study level/ semester at which this course is offered:**	*3rd Level / 2nd Semester*				
٥	**Pre –requisite (if any):**	General Biology				
٦	**Co –requisite (if any):**					
٨	**Program (s) in which the course is offered:**	*Bachelor of Pharmacy*				
٩	**Language of teaching the course:**	*English*				
١٠	**Location of teaching the course:**	*Faculty of Medical Sciences, Thamar University Main.*				
11	**Prepared By:**	*Assoc. Prof. Dr. Abdulelah H. Al-Adhroey*				
12	**Date of Approval**					

II. Course Description:

The Medical Parasitology course provides an overview of human parasites and their diseases. Topics include the basic concept of medical helminthology, protozoology and entomology: types of parasites, host vector relationship, classification, mode of infections and effect of parasites upon host, distribution, morphology, life cycle, clinical features, pathology, treatment, prevention and control.

III. Course Objectives:

After completing this program, students would be able to recognize basic concepts of medical helminthology, protozoology and entomology

IV. Course Intended Learning Outcomes (CILOs) :

Knowledge and Understanding:

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

Knowledge and Understanding PILOs	Knowledge and Understanding CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
	a1 Define and classify the medically important morphology and clinical parasites criteria
	a2 Classify parasites of medical importance in its broad scientific taxonomic positions and their habitat in the human body
	a3 List the definitive host, intermediate host and reservoir host if found in case of parasitic infections and zoonosis.
	a4 Classify arthropods that are mechanical and biological vectors of important human pathogens.
	a5 Relate the life cycle of different parasites of medical importance with pathogenesis (in terms of host- parasite relationship) of different parasitic infections.
	a6 Correlate the life cycle of different parasites of medical importance in terms of host- parasite relationship to clinical picture
	a7 Describe the infective stage, diagnostic methods and prevention and control methods of different parasitic infections and infestations.

Intellectual Skills :

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

Intellectual Skills PILOs	Intellectual Skills CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
B1	**b1** Correlate the structural and functional alteration due to different parasites with the clinical picture of diseases caused by them in terms of the host parasite relationship.
-	b2 Analyze and integrate results of history, physical examination and investigations of a case scenario to reach

	differential diagnosis and diagnosis of the underlying parasitic cause (s).
	b3 Select appropriate diagnostic methods (direct and indirect) of different parasites according to life cycle.
	b4 Interpret the geographical distribution for areas where parasites are found (especially endemic areas) as a useful information in the patient history.

Professional and Practical Skills	
Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)	
Professional and Practical Skills PILOs	**Professional and Practical Skills CILOs**
After completing this program, students would be able to:	**After completing this course, students would be able to:**
C1	c1 Identify the different stages of parasites using simple or compound microscope or diagrams and comment on diagnostic, infective stages or vectors of disease transmission.
	c2 Examine to identify the snails (intermediate hosts of some parasites) that can be of epidemiological importance.
	c3 Practice the basics of safety procedures during laboratory classes

Transferable (General) Skills :	
Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)	
Transferable (General) Skills PILOs	**Transferable (General) Skills CILOs**
After completing this program, students would be able to:	**After completing this course, students would be able to:**
D1	d1 Adopt the principles of lifelong learning needed for continuous professional development.
	d2 Evaluate information including the use of information technology where applicable

V. Alignment Course Intended Learning Outcomes

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
	Interactive lectures Discussion Brain Storm Seminars..	Exam Assignments Presentations Quizzes

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
	- Interactive lectures - discussion and dialog - Brain Storm - Problem solving - Seminars. - Case study	Exam Assignments Presentations. Oral presentations.

(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
	Practical training in the laboratory. Group (Small group) discussion Lab activities	Practical Exams Assignments Presentation/ observation Lab. Reporting / Report case

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
	- Independent study - Group work activities - Written researches.	

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	Contact hours	Learning Outcomes (CILOs)
1	**Introduction to Medical Parasitology**	- Common terms of parasitology, types of parasites, host vector relationship, classification, mode of infections and effect of parasites upon host, distribution, morphology, life cycle, clinical features, pathology, treatment, prevention and control.	1	2	a1-a3; b1
2	**Soil-transmitted Helminths and Enterobius vermicularis**	- Ascariasis: Ascaris lumbricoides - Trichuriasis: *Trichuris trichiura* - Hookworms: *Ancylostoma duodenale*, *Necater americanus*	1	2	a1-a2; b2-b3
3	**Soil-transmitted Helminths and Enterobius vermicularis**	- *Strongyloides stercoralis* - Cutaneous and visceral larva migrans - Entembius vermicularis	1	2	a1-a2; b2-b3
4	**Tissue Nematodes**	- *Trichinella spiralis* - Filariasis: *Wuchereria* species, Loiasis, *Loa loa* - Onchocerciasis: *Onchocerca volvulus* - Dracunculiasis: *Dracunculus medinensis*	1	2	a1, a2, b2-b3
5	**Trematoda**	- Schistosomiasis: *Schistosoma haematobium*, S. *mansoni*, S. species. - Fascioliasis and Fasciolopsiasis: *Fasciola hepatica* and *F. gigantica* and *Fasciolopsis buski* - *Heterophyes heterophyes*, *Metagonimus yokogawai* - *Paragonimus westermani*	1	2	a1-a7 b1-b4
6	**Cestoda**	- Taeniasis: *Taenia saginata* and *T. solium*, Cysticercosis - Hydatid disease: *Echinococcus* sp. - Hymenolepiasis: *Hymenolepis nana*, *H. diminuta*	1	2	a1-a7; b2,b4

		- *Dipylidium caninum*, *Diphyllobothrium latum* and sparganosis			
7	**Midterm Exam.**		1	2	
8	**Amoebae**	- *Entamoeba histolytica* - *Acanthamoeba* species - *Naegleria* species - Differentiation of cysts of non-pathogenic species of amoebae that can be found in faeces.	2	2	a1-a7 b2-b3
9	**Flagellates & Ciliates**	- *Giardia lamblia* - *Trichomonas vaginalis* - *Trypanosoma* species - *Leishmania* species - *Balantidium coli*	1	2	a1-a7 b1-b4
10	**Blood and Tissue coccidia**	- *Plasmodium* species - *Toxoplasma gondii*	1	2	a1-a7 b2-b3
11	**Intestinal coccidia and *Microsporidia***	- *Isospora belli* - *Cryptosporidium parvum* - *Cyclospora cayetanensis* - *Microsporidia* o *Encephalitozoon* species o *Enterocytozoon* species	1	2	a1-a7 b2
12	**Arthropoda**	- Insecta: o Mosquitoes, fleas, flies, lice and bugs	1	2	a1-a7 b2,b3
13	**Arthropoda**	- Arachnida: o Ticks, mites and scorpion - Crustacea: o Cyclops	1	2	a1-a7 b2,b3
14	**Immunity of parasite infection**	- Immunity of parasite infection	1	2	a1-a7 b2,b3
15	**Final Exam.**		1	2	
Number of Weeks /and Units Per Semester			**16**	**32**	

B – Case Studies and Practical Aspect: (if any)

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Introduction to diagnostic parasitology	1	2	c 1.
2	Stool Examination (Demonstration): Direct and concentration methods and specimen collection and transportation	1	2	c1,c3
3	Blood, urine and other body fluid examination and specimen collection and transportation	1	2	c1,c3
4	Diagnosis of Nematode	1	2	c1.c3
5	Diagnosis of Trematode	1	2	c1- c3
6	Diagnosis of Cestode	1	2	c1,c3
7	**Midterm Exam.**	1	2	c1-c3
8	Diagnosis of Protozoa Trophozoites and cysts	1	2	c1,c3
9	Blood Smear: Preparation for malaria examination	1	2	C3
10	Sero-diagnosis of parasitic infections	1	2	C2, c3
11	Molecular techniques in diagnosis of parasitic infections	1	2	C2; C3
12	Diagnostic entomology: Insecta	1	2	c1, c3
13	Diagnostic entomology: *Arachnida* and *Crustacea*	1	2	C1, c3
14	Final Exam	1	2	
Number of Weeks /and Units Per Semester		**14**	**28**	

VI. Teaching strategies of the course:

1- Interactive lectures.
2- Group discussion.
3- Practical training in the laboratory.
4- Seminars.
5- Written researches.

VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Attendance; Quiz (2)			
2				
3				
4				

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	Quiz (2)	3	3	3%	a1- a3
2	Attendance	Continuous	5	5%	
3	Written midterm test	7	10	10%	a1- a7
4	Practical midterm exam and Lab. reports	7	10	10%	c1- c3
5	Research and seminars	11	2	2%	a1-a7; b1- b4; d1- d2
6	Practical final exam	15	10	10%	c1-c3
7	Final Exam (Oral and Written)	15	60	60%	a1- a7; b1- b4
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).

1- Medical Microbiology: By F.H., Kayser, et al.
2- District Laboratory Practice in Tropical Countries Part 1: By Monica Cheesbrough

2- Essential References.

1- Topley & Wilson's microbiology & microbiological infections By F.E.G. Cox, Derek Wakelin, Stephen H. Gillespie and Dickson D. Despommier
2- Colour Atlas of Tropical Medicine and Parasitology By W. Peters& H.M. Gillies

3- Electronic Materials and Web Sites *etc*.

1- Parasites online:http: //WWW.parasitesonline.net/homepage.htm.
www.getbodysmart.com/ap/histology/menu/menu.html
2- http://WWW.parasitology.org.uk
3- http://WWW.cvm.okstate.edu/~users/jcfox/htdocs/clinpara/index.htm

Faculty of Medical Sciences

Department of Pharmacy

Program of Bachelors Pharmacy

Course Specification of Pharmaceutics III Course Code. (PH1123173)

2024

I. Course Identification and General Information:

1	**Course Title:**	*Pharmaceutics III*				
2	**Course Code & Number:**	**PH1123273**				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		*1*		*3*
4	**Study level/ semester at which this course is offered:**	*3rd level/ 2nd semester*				
5	**Pre –requisite (if any):**	*Pharmaceutics II*				
6	**Co –requisite (if any):**					
7	**Program (s) in which the course is offered:**	*Bachelor of Pharmacy*				
8	**Language of teaching the course:**	*English*				
9	**Study System**	*Semester*				
10	**Mode of delivery:**	*Regular*				
11	**Location of teaching the course:**	*Faculty of Medical Sciences, Themar University*				
12	**Prepared By:**	*Dr. Abdulkarim Kassem Alzomor*				
13	**Date of Approval**					

II. Course Description:

This course was designed as complimentary part of (Pharmaceutics I, II) courses. In contrast to the previous course which deal with liquid, semisolid or gaseous dosage form, this course provides knowledge and skills in designing solid pharmaceutical dosage, including powders, granules, tablets and capsules, which are globally the most widely manufactured dosage forms. In addition, the course covers pharmaceutical sterile products.

III. Intended learning outcomes (ILOs)

Course Intended Learning Outcomes		Program Intended Learning Outcomes	
a1	Describe the stages of designing pharmaceutical solid and sterile dosage forms	**A1**	knows the basic principles of pharmaceutical, medical, health & environmental sciences, as well as, pharmaceutical calculations.
a2	Explicit the general properties, the types and roles of excipients, advantages and disadvantages of pharmaceutical solid and sterile dosage forms**.**	**A2**	Sufficiently knows of the analytical & biotechnical techniques, necessary for isolation, refinement, analysis& titration& manufacturing of pharmaceutical substances & preparations
b1	Classify pharmaceutical solid and sterile dosage forms.	**B2**	Accurately suggests of the correct choice of the drug treatment for various disease conditions according to the foundations of pharmacological therapy
b2	Design pharmaceutical solid and sterile dosage forms.	**B4**	properly Innovates of pharmaceutical products & evaluates them on the scientific bases.
c1	Handle efficiently and safely the chemical materials and tools used in the laboratory.	**C2**	Applies the concepts of pharmacovigilance in the dispensing and the preparation, storage and distribution of medicines safely and effectively
c2	Operate the instruments and prepare extemporaneous pharmaceutical solid and sterile dosage forms.	**C4**	Efficiently operates, the different technologies and equipment in the area of pharmacy
d1	Participate efficiently with colleagues in a team work.	**D1**	Works effectively in a unique team
d2	Communicate effectively and behave in discipline with colleagues.	**D4**	Resides excellent relationships with the patients & related healthcare directions.

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies

a1. Describe the stages of designing pharmaceutical solid and sterile dosage forms .	- Lectures and Groups discussion. - Practical presentations Self - learning.	Quizzes, Written exam.
a2. Explicit the general properties, the types and roles of excipients, advantages and disadvantages of pharmaceutical solid and sterile dosage forms .		

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Classify pharmaceutical solid and sterile dosage forms .	- Discussions and - Training - Field visits - Problem solving	- Quizzes, Homework - Observation - Task's Evaluates
b2. Design pharmaceutical solid and sterile dosage forms .		

(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 laboratory.	- Discussions and - Training - Field visits - Problem solving	- Quizzes, Homework - Observation - Task's Evaluates
c2. Operate the instruments and prepare extemporaneous pharmaceutical solid and sterile dosage forms .		

(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	- Group discussions	- Homework

in discipline with colleagues. d2. Participate efficiently with colleagues in a team work.	- Cooperative learning. - Self – learning - Inductive and deductive	- Evaluates of Oral Presentation

IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1	**Solid dosage forms: (1) Introduction & Powders**	a1, a2, b1, b2	**Introduction** □ classifications of dosage forms □ Advantages and disadvantages □ Formulation consideration **Powders** □ Definitions, advantages, disadvantages □ classification (coarse, fine, micro fine, etc; divided, bulk; compounded; medicated, cosmetic) □ Formulation considerations □Bulk powder, divided powder and Dusting powder:: formulation, examples □ Powders problems & overcome □ Powders packaging □ Quality control evaluation	2	4
2	**Solid dosage forms: (2) Granules**	a1, a2, b1, b2,d2	□ 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)**	a1, a2, b1, b2, c1, d1	□ Advantages and disadvantages. □ Types and Ideal properties of tablets	5	

	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, extended release coating : advantages, disadvantages, coating materials, process of coatings □ Quality evaluation		10
4	Mid-term Exam			1	2
5	**Solid dosage forms: (4) Capsules**	a1, a2, b1, b2, c2,d1	**(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
6	**Sterile pharmaceutical dosage forms** (Introduction	a1, a2, b1, b2, d2	**Differences between sterile & non-sterile dosage forms :** • Definition : sterility, sterilization, preservation, pyrogenicity, pyrogen-free • Review of sterilization methods and preservation of dosage forms	1	

	)		• 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		2
7	**Sterile pharmaceutical dosage forms** (Parenteral preparations)	a1, a2, b1, b2, d1	• 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
8	**Sterile pharmaceutical dosage forms** (Ophthalmic preparations)	a1, a2, b1, b2, d1	• Anatomical features of the eye • Types of ophthalmic preparations • Formulation considerations • Sterilization and preservation. • Package • Quality evaluation	1	2
9	FINAL - EXAM			1	2
Number of Weeks /and Units Per Semester				**17**	**34**

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
1.	Preparation of Dusting powders	**1**	**2**	c1,c2, , d1, d2
2.	Preparation of Effervescent base granules	**1**	**2**	c1,c2, , d1, d2
3.	Preparation of tablets using wet granulation	**1**	**2**	c1,c2, , d1, d2

	method : paracetamol tablets			
4.	Preparation of tablets using wet granulation method : mefenamic acid tablets	**1**	**2**	c1,c2, , d1, d2
5.	Preparation of tablets using direct compression method : aspirin tablets	**1**	**2**	c1,c2, , d1, d2
6.	film-coating of tablets mefenamic acid	**1**	**2**	c1,c2, , d1, d2
7.	Preparation of hard gelatin capsules (Manual): aspirin	**1**	**2**	c1,c2, , d1, d2
8.	Preparation of hard gelatin capsules (Manual): paracetamol	**1**	**2**	c1,c2, , d1, d2
9.	Preparation of I.V. admixtures : DNS + vitamin C + vitamin B complex	**1**	**2**	c1,c2, , d1, d2
10.	Preparation of parenteral solutions from parenteral powders : reconstitution of cefuroxime sodium vial	**1**	**2**	c1,c2, , d1, d2
11.	Preparation of sterile NaCl eye wash.	**1**	**2**	c1,c2, , d1, d2
12	Final exam	1	2	c1,c2d1, d2
Number of Weeks /and Units Per Semester		**12**	**24**	

V. Teaching strategies of the course:

- Lectures
- Groups discussion.
- Discussions and Training
- Practical presentations
- Field visits
- Problem solving
- Practical in Lab
- Cooperative learning.
- Simulation Group discussions
- Self – learning
- Inductive and deductive

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark

1	Class attendance and participation	**a1, a2, b1, b2, c1, d1, d2**	weekly	2.5
2	Homework, presentation	**a1, a2, b1, b2, c1, d1.**	11	2.5

VII. 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		1-14	5	**5%**	a1,b1,b2,c1, a2, d1,d2
2	Quizzes 1		**6**	**2.5**	**2.5%**	a1,a2, c1,b1
3	Mid-semester exam of theoretical part (written exam		**8**	**20**	**20%**	a1,a2,b1,c1, d1,d2
	Quizzes 2		**12**	**2.5**	**2.5%**	a2, b1, b2, c1, d1, d2
4	Lab. Term works	Attitude	1-12	5	**5%**	c1, c2,d1,d2
5		Accomplishments		5	**5%**	
6	Final exam (practical)		12	20	20%	c1, c2,d1,d2
7	Final exam of theoretical part (written exam)		17	40	40%	a1,a2,b1,b2,c1, d1,d2
Total				100	100%	

VIII. Learning Resources

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

1. Aulton M.E., Pharmaceutics: the science of dosage form design, 2002, Churchill Livingstone, UK
2. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA.

2- Essential References.

1. Williams and Wilkins (2005). Remington; the Science and Practice of Pharmacy (2first edition). Publisher: Lippincott.
2. .Patrick J. Sinko (2006). Martin's Physical Pharmacy and Pharmaceutical Sciences.

3- Electronic Materials and Web Sites *etc*.

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.

Faculty of Medical Sciences

Department of Pharmacy

Program of Bachelors Pharmacy

Course Plan (Syllabus) of Pharmaceutics III Course Code. PH1123173

I. Information about Faculty Member Responsible for the Course:								
Name of Faculty Member:		Office Hours						
Location& Telephone No.:	-----							
E-mail:	--@--.--	SAT	SUN	MON	TUE	WED	THU	

2024

I. Course Identification and General Information:						
1-	**Course Title:**	*Pharmaceutics III*				
2-	**Course Number & Code:**	**PH1123273**				
3-	**Credit hours:**	**C.H**				**Total**
		Th.	**Seminar**	**Pr.**	**F. Tr.**	
		2		1		3
4-	**Study level/year at which this course is offered:**	*3rd level/ 2nd semester*				
5-	**Pre –requisite (if any):**	*Pharmaceutics II*				
6-	**Co –requisite (if any):**					
7-	**Program (s) in which the course is offered**	*General Pharmacy and PharmD*				
8-	**Language of teaching the course:**	*English /Arabic*				
9-	**System of Study:**	*Semester*				
10-	**Mode of delivery:**	*Regular*				
11-	**Location of teaching the course:**	*Themar University campus*				

II. Course Description:

This course was designed as complimentary part of (Pharmaceutics I, II) courses. In contrast to the previous course which deal with liquid, semisolid or gaseous dosage form , this course provides knowledge and skills in designing solid pharmaceutical dosage, including powders, granules, tablets and capsules, which are globally the most widely manufactured dosage forms. In addition, The course covers sterile pharmaceutical products.

III. Intended learning outcomes (ILOs) of the course:

- Brief summary of the knowledge or skill the course is intended to develop:

1. Describe the stages of designing pharmaceutical solid and sterile dosage forms
2. Explicit the general properties, the types and roles of excipients, advantages and disadvantages of pharmaceutical solid and sterile dosage forms .
3. Design pharmaceutical solid and sterile dosage forms .
4. Classify pharmaceutical solid and sterile dosage forms .
5. Handle efficiently and safely the chemical materials and tools used in the laboratory
6. Operate the instruments and prepare extemporaneous pharmaceutical solid and sterile dosage forms .
7. Communicate effectively and behave in discipline with colleagues.
8. Participate efficiently with colleagues in a team work.

IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours
1	**Solid dosage forms: (1) Introduction & Powders**	**Introduction** □ classifications of dosage forms □ Advantages and disadvantages □ Formulation consideration **Powders** □ Definitions, advantages, disadvantages □ classification (coarse, fine, micro fine, etc; divided, bulk; compounded; medicated, cosmetic) □ Formulation considerations □Bulk powder, divided powder and Dusting powder:: formulation, examples □ Powders problems & overcome □ Powders packaging □ Quality control evaluation	2	4

2	**Solid dosage forms: (2) Granules**	□ 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**	□ 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, extended release coating : advantages, disadvantages, coating materials, process of coatings □ Quality evaluation	5	10
4	Mid-term Exam		1	2
5	**Solid dosage forms: (4) Capsules**	**(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.	3	6

		• Soft gelatin capsule formulation. • capsule filling process • specific properties:O2 impermeability, water content		
6	**Sterile pharmaceutical dosage forms** (Introduction)	**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
7	**Sterile pharmaceutical dosage forms** (Parenteral preparations)	• 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
8	**Sterile pharmaceutical dosage forms** (Ophthalmic preparations)	• Anatomical features of the eye • Types of ophthalmic preparations • Formulation considerations • Sterilization and preservation. • Package • Quality evaluation	1	2
9	FINAL - EXAM		1	2
Number of Weeks /and Units Per Semester			**17**	**34**

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours
1	Preparation of Dusting powders	1	2
2	Preparation of Effervescent base granules	1	2
3	Preparation of tablets using wet granulation method : paracetamol tablets	1	2
4	Preparation of tablets using wet granulation method : mefenamic acid tablets	1	2
5	Preparation of tablets using direct compression method : aspirin tablets	1	2
6	film-coating of tablets mefenamic acid	1	2
7	Preparation of hard gelatin capsules (Manual): aspirin	1	2
8	Preparation of hard gelatin capsules (Manual): paracetamol	1	2
9	Preparation of I.V. admixtures : DNS + vitamin C + vitamin B complex	1	2
10	Preparation of parenteral solutions from parenteral powders : reconstitution of cefuroxime sodium vial	1	2
11	Preparation of sterile NaCl eye wash.	1	2
12	Final exam	1	2
Number of Weeks /and Units Per Semester		12	24

V. Teaching strategies of the course:

- Lectures
- Groups discussion.
- Discussions and Training
- Practical presentations
- Field visits
- Problem solving
- Practical in Lab
- Cooperative learning.
- Simulation Group discussions

- Self – learning
- Inductive and deductive

VI. Assignments:

No	Assignments	Week Due	Mark
1	Class attendance and participation	weekly	2.5
2	Homework, presentation	11	2.5

VII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method		Week Due	Mark	Proportion of Final Assessment
1	Assignments		1-16	5	**5%**
2	Quizzes 1		**6**	**2.5**	**2.5%**
3	Mid-semester exam of theoretical part (written exam		**8**	**20**	**20%**
	Quizzes 2		**12**	**2.5**	**2.5%**
4	Lab. Term works	Attitude	1-12	5	**5%**
5		Accomplishments		5	**5%**
6	Final exam (practical)		12	20	20%
7	Final exam of theoretical part (written exam)		17	40	40%
Total				100	100%

IX. Learning Resources

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

3. Aulton M.E., Pharmaceutics: the science of dosage form design, 2002, Churchill Livingstone, UK
4. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA.

2- Essential References.

3. Williams and Wilkins (2005). Remington; the Science and Practice of Pharmacy (2first edition). Publisher: Lippincott.
4. .Patrick J. Sinko (2006). Martin's Physical Pharmacy and Pharmaceutical Sciences.

3- Electronic Materials and Web Sites *etc*.

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 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 Medicinal Chemistry I

I. Course Identification and General Information:						
١	**Course Title:**	**Medicinal Chemistry I**				
٢	**Course Code &Number:**	**PH1123236**				
٣	**Credit hours:**	C.H				TOTAL Credit Hours
		Th.	Seminar	Pr	Tr.	
		2		1		3
٤	**Study level/ semester at which this course is offered:**	Level 3 / 2nd Semester				
٥	**Pre –requisite (if any):**	Pharmaceutical Organic Chemistry I, II, and III, Pharmacology I.				
٦	**Co –requisite (if any):**					
٨	**Program (s) in which the course is offered:**	Bachelor of Pharmacy				
٩	**Language of teaching the course:**	English				
١٠	**Location of teaching the course:**	Faculty of Medical Sciences				
11	**Prepared By:**	Dr. Sam Dawbaa				
12	**Date of Approval**					

II. Course Description:

This course aims to provide the students with a basic knowledge about aspects of the design and action of drugs, drug discovery, drug development, and drug/receptor interactions, types of chemical bonds involved in drug-receptor interactions, drug mechanism of action, and drug metabolism. Also to enable the student to explain the drug-receptor interactions by drug design concept.

III. Course Objectives:

1. To provide the student with basic knowledge of the effect of the physicochemical properties of drugs on the pharmacokinetic profile (absorption, distribution, metabolism, and excretion).
2. To give a background on the concept of Drug Design.
3. To educate the student with the principles of structure-activity relationships (SAR) and illustrate the effect of functional groups modification on the pharmacodynamics and pharmacokinetics.
4. To give the student a detailed background of the metabolic pathways of drugs illustrating the chemistry behind them.
5. To explain the Prodrug concept.
6. To explain the mechanism of action, SARs, and chemical synthesis of drugs of the adrenergic and cholinergic systems

IV. Course Intended Learning Outcomes (CILOs) :

Knowledge and Understanding:

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

Knowledge and Understanding PILOs	Knowledge and Understanding CILOs	Teaching Strategies
After completing this program, students would be able to:	**After completing this course, students would be able to:**	**Lectures, Discussions, Self-learning.**
A1 Explain the relationship between the structural activity relationship (SAR)and its pharmacokinetics and pharmacological activity.	a1: Explain the structure-activity relationship (SAR) of the drugs of the adrenergic and cholinergic nervous systems.	Lectures, Discussions, Self-learning.
A2 Understand the chemistry of drug-receptor interaction.	a2: • Explains the relationship between solubility and drug activity. • Discuss the relationship between ionization and drug activity. • Discuss the relationship between chemical properties and drug activity. • Interprets the relationship between steric properties and drug activity. • Interprets the relationship between bioisosterism and drug activity.	Lectures, Discussions, Self-learning.
A3: Understand the metabolic pathways of drugs in the body.	a3: • Discusses the basic principles of drug metabolism. • Discuss the biosynthesis of the adrenergic and cholinergic neurotransmitters. • Explain the metabolism of drugs acting by adrenergic and cholinergic mechanisms.	Lectures, Discussions, Self-learning.

Intellectual Skills :

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

Intellectual Skills PILOs	Intellectual Skills CILOs	Teaching Strategies
After completing this program, students would be able to:	**After completing this course, students would be able to:**	**The following strategies should be used:**

B1 Discuss the structure activity relationships (SAR) that control the pharmacokinetics and pharmacodynamics	b1: Identify the structural features of drugs responsible for their therapeutic and adverse effets.	Lectures, Discussions, Seminars, Self-learning.
	b2: Predict the pharmacokinetics of drugs based on their physicochemical properties.	Lectures, Discussions, Seminars, Self-learning.

Professional and Practical Skills		
Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)		
Professional and Practical Skills PILOs	**Professional and Practical Skills CILOs**	**Teaching Strategies**
After completing this program, students would be able to:	**After completing this course, students would be able to:**	**The following strategies should be used:**
C1. Use efficiently equipment and suitable methods for determination of physicochemical properties and assay of drugs and synthetical methods for some important pharmacophores.	c1: Determine certain physicochemical properties of some drugs	Lectures, Lab. experiments, Presentations, Brain-storming.
	c2: Achieve assays of some drugs based on pharmacopoeia.	Lectures, Lab. experiments, Presentations, Brain-storming.

Transferable (General) Skills :		
Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)		
Transferable (General) Skills PILOs	**Transferable (General) Skills CILOs**	**Teaching Strategies**
After completing this program, students would be able to:	**After completing this course, students would be able to:**	**The following strategies should be used:**
D1 Use chemistry-related softwares and search efficiently for medical	d1: To use famous websites used in	Discussions, Presentations, Self-

information from professional medical sites.	medicinal chemistry researches including SwissADME, ChemBL, PubChem, Siencedirect, and Google Scholar. d2: Use important software such as ChemDraw, ChemSketch, and has a knowledge about Molecular Docking software.	learning.

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	**Introduction:** **Physicochemical properties affecting the activity of drugs**	• Solubility, Partition coefficient, Acid-Base properties, Polarity, Hydrogen bonding, and Lipophilicity. • Applications of these properties on drug discovery e.g., Lipinski's Rule of Five.	1	2	a1, a2, a3, b1, b2, d1, d2
2	**Effect of Stereochemistry on drug activity**	• Stereochemistry (Isomerism). • Types of isomers. • The role of stereochemistry in biological activity. • Isosterism and bioisosterism.	1	2	a1, a2, a3, b1, b2, d1, d2
3	**The molecular properties of drugs**	• Chemical bonds, Ionization, and Steric properties. • Drug-receptor interaction. • Contribution of some functional groups to drug activity.	1	2	a1, a2, a3, b1, b2, d1, d2
4	**Principles of drug design and discovery.**	• Classification of drug design methods. • Stages of drug discovery. • Development of lead compounds.	1	2	a1, a2, a3, b1, b2, d1, d2

5	**Prodrugs**	• Definition and objectives of prodrugs. • Modification of functional groups to produce prodrugs.	1	2	a1, a2, a3, b1, b2, d1, d2
6	**Drug Metabolism 1**	• Introduction. • Factors affecting drug metabolism. • Classification and objectives of the metabolic pathways of drugs.	1	2	a1, a2, a3, b1, b2, d1, d2
7	**Drug metabolism 2**	• Phase-I (Functionalization) reactions.	1	2	a1, a2, a3, b1, b2, d1, d2
8	**Mid-term Exam**	Mid-term Exam	1	2	a1, a2, a3, b1, b2, d1, d2
9	**Drug metabolism 3**	• Phase-II (Conjugation) reactions.	1	2	a1, a2, a3, b1, b2, d1, d2
10	**Drugs acting on the adrenergic (sympathetic) nervous system**	• Introduction and classification of the nervous system. • Chemical structure and Biosynthesis of sympathetic neurotransmitters and neurotransmission in the sympathetic nerves. • Adrenergic receptors: classification, distribution, and functions.	1	2	a1, a2, a3, b1, b2, d1, d2
		• Adrenergic receptors agonists (sympathomimetic agents): Mechanism of action, uses, and adverse effects. • SARs of Phenylethylamines. • Chemical synthesis of some adrenergic agonists.	1	2	a1, a2, a3, b1, b2, d1, d2
		• Adrenergic receptors antagonists (sympatholytic agents): MOA, uses, and adverse effects. • SARs of α1-blockers and β-blockers. • Chemical synthesis of some sympatholytic agents.	1	2	a1, a2, a3, b1, b2, d1, d2

11	**Drugs acting on the cholinergic (parasympathetic) nervous system**	• Chemical structure and biosynthesis of parasympathetic neurotransmitters and neurotransmission in the cholinergic nerves. • Cholinergic receptors: classification, distribution, and functions. • Chemical properties and SARs of acetylcholine and related compounds.	1	2	a1, a2, a3, b1, b2, d1, d2
		• Cholinomimetic agents: Classification, MOA, uses, and adverse effects. • Reversible acetylcholinesterase (AChE) inhibitors for Alzheimer's disease. • Chemical properties of irreversible AChE inhibitors (organophosphorus compounds) and the effect on biological activity. • Chemical synthesis of some cholinomimetic agents.	1	2	a1, a2, a3, b1, b2, d1, d2
		• Cholinergic receptor antagonists: Classification, MOA, uses, and adverse effects. • SARs of muscarinic antagonists • SARs of nicotinic antagonists. • Chemical synthesis of some parasympatholytic agents.	1	2	a1, a2, a3, b1, b2, d1, d2
	Final Exam	Final	1	2	
Number of Weeks /and Units Per Semester		**16**		**32**	

B – Case Studies and Practical Aspect: (if any)

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Determination of solubility of some drugs in various solvents	1	2	c1, c2, d1, d2
2	Determination of partition coefficient and lipophilicity (Log P) of some drugs	1	2	c1, c2, d1, d2
3	Determination of partition coefficient and lipophilicity (Log P) of some drugs	1	2	c1, c2, d1, d2
4	Experimenting the effect of acids and bases on the solubility of some drugs: Salts formation	1	2	c1, c2, d1, d2
5	Experimenting the effect of acids and bases on the solubility of some drugs: Salting out	1	2	c1, c2, d1, d2
6	*In silico* evaluation of physicochemical properties of selected drugs using SwissADME website	1	2	c1, c2, d1, d2
7	Determination of pKa for acetic acid	1	2	c1, c2, d1, d2
8	Introduction to limit tests	1	2	c1, c2, d1, d2
9	Limit test of chloride	1	2	c1, c2, d1, d2
10	Limit test of sulphate	1	2	c1, c2, d1, d2
11	Limit test of iron	1	2	c1, c2, d1, d2
12	Limit test of lead	1	2	c1, c2, d1, d2
13	Application of limit tests to some drugs	1	2	c1, c2, d1, d2
14	Application of limit tests to some drugs	1	2	c1, c2, d1, d2
15	Final Exam	1	2	
Number of Weeks /and Units Per Semester		**15**	**30**	

VI. Teaching strategies of the course:

Lectures, Discussions, Simulated software program, Self-learning, Seminars, Lab Experiments

VII. 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 (Homework and class discussion activity)		1-12	5	5%	a1,a2,
2	Quiz 1		4	2.5	2.5%	a1,a2, ,b1,b2
3	Mid-semester exam of theoretical part (written exam)		8	10	10%	c1,c2,
4	Quiz 2		12	2.5	2.5%	c1,c2,
5	Lab. Term works	Attitude	1-14	5	5%	c1, c2,d1,d2
6		Accomplishments		5	5%	
7	Final exam (practical)		15	20	20%	c1, c2,d1,d2
8	Final exam of theoretical part		16	50	50%	a1,a2,b1,b2,c1, d1,d2
Total				100	100%	

VIII. Learning Resources:

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

1. An Introduction to Medicinal Chemistry, 5th edition, Graham Patrick, Oxford University Press, 2013.
2. Foye's Principles of Medicinal Chemistry, 7th edition, Thomas L. Lemke and David A. Williams, Lippincott Williams & Wilkins, 2013.

2- Essential References.

1. Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, 13th edition, J. N. Delgado and W. A. Remers, Lippincott, 2017.
2. Kar, A. (2007). Advanced practical medicinal chemistry. New Age International.
3. Pedersen, O. (2006). Pharmaceutical Chemical Analysis: Methods for Identification and

Limit Tests. Ukraine: CRC Press.

3- Electronic Materials and Web Sites *etc*.

http://www.swissadme.ch/index.php

https://orgsyn.org/

https://www.ebi.ac.uk/chembl/

https://pubchem.ncbi.nlm.nih.gov/

https://go.drugbank.com/drugs/DB00605

https://guides.library.vcu.edu/c.php?g=47681&p=298306

Course Specification of Phytochemistry II

I. Course Identification and General Information:

١	**Course Title:**	**Phytochemistry II**				
٢	**Course Code &Number:**	*PH1123245*				
٣	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		1		3
٤	**Study level/ semester at which this course is offered:**	**3rd level/ 2nd semester**				
٥	**Pre –requisite:**					
٦	**Co –requisite:**	**No**				
٨	**Program (s) in which the course is offered:**	**Bachelor of Pharmacy**				
٩	**Language of teaching the course:**	**English**				
١٠	**Location of teaching the course:**	**Faculty of Medical Sciences – Thamar University**				
11	**Prepared By:**					
12	**Date of Approval**	**2022**				

I. Course **Description**:

The course aims to provide students with the necessary skills for extraction, separation chemical structures, identification, quantitative determination of the active ingredients (essential oils - glycosides- tannins, terpenoids, coumarins) from natural sources - and then identify these active ingredients either in pure form or in a mixture - a as different methods to evaluate these components, and their medicinal uses

II. Aims and Intended learning outcomes (ILOs) of **the** course:

1. Aims of The Course:

The overall aims of the course are:

- To provide the students with the knowledge and skills that enable them to understand, describe a deal with the chemistry of glycosides, tannins, volatile oil , comarins of plant origin and the relate techniques.

2. Intended learning outcomes (ILOs) of the course:

A. Knowledge And Understanding:

- **After successful completion the course, students will be able to:**

Program Intended Learning Outcomes (Sub-PILOs)		**Course Intended Learning Outcomes (CILOs)**	
A1 A2		a1 a2	: Discuss principles and applications of phytochemistry in synthesis, isolation, purification and identification of plant active constituents. : Understand principles of qualitative and quantitative determination of plant active constituents (such as volatile oils –– glycosides-tannins, coumarins) a3: Enumerate the theories of isolation, synthesis, purification, identification and standardization of natural products..

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies

a1- Discuss principles and applications of phytochemistry in synthesis, isolation, purification and identification of plant active constituents.	• Lectures • Discussion Sessions • Assignments	• Periodic exam (Quizzes) • Home Assignments • Exams
a2- Understand principles of qualitative and quantitative determination of plant active constituents (such as volatile oils –– glycosides-tannins, coumarins)		
a3- Enumerate the theories of isolation, synthesis, purification, identification and standardization of natural products..		

B. Cognitive/Intellectual Skills

- **After successful completion the course, students will be able to**

Program Intended Learning Outcomes (Sub- PILOs)		**Course Intended Learning Outcomes (CILOs)**	
B1 B2		**b1** **b2:** b3	**:**design qualitative and quantitative methods for different classes of natural products. Select the appropriate methods to separate, identify and estimate the active substances. : Determine suitable methods of analysis and quality control of drugs as raw material, in dosage forms and in biological fluids.

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- design qualitative and quantitative methods for different classes of natural products.	• Discussion Sessions • Problem solving • Group Discussion	• Oral presentations • Home assignments
b2- Select the appropriate methods to separate, identify and estimate the active substances.		
b3- Determine suitable methods of analysis and quality control of drugs as raw material, in dosage forms and in biological fluids		

C. **Practical/Professional Skills**

- **After successful completion the course, students will be able to:**

Program Intended Learning Outcomes (Sub- PILOs)		**Course Intended Learning Outcomes (CILOs)**	
C 2 C 4		c1 c2 c3	:Perform different laboratory procedures in the analysis of active constituents of natural sources : Apply appropriate methods for extraction, isolation, synthesis, purification, identification and standardization of active substances (of plant origin). : Raise public awareness on rational use of drugs and social health hazards of abused and misused drugs of natural origin

©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- Perform different laboratory procedures in the	• Discussion Sessions • Assignments	• Oral presentations

analysis of active constituents of natural sources		• Exams • LAB report
c2- Apply appropriate methods for extraction, isolation, synthesis, purification, identification and standardization of active substances (of plant origin).		
c3- Raise public awareness on rational use of drugs and social health hazards of abused and misused drugs of natural origin		

D. **General And Key Transferable Skills**

- **After successful completion the course, students will be able to:**

Program Intended Learning Outcomes (Sub- PILOs)	**Course Intended Learning Outcomes (CILOs)**
D1 D4	**d1:** Use information technology skills including word processing and information retrieval through online computer searches in writing a reportabout the chemistry of natural products. **d2:** : Acquire independent study skills and problem solving in groups for continuing professional development needs. **d3:** Work in groups and manage his/her time

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Use information technology skills including word processing and information retrieval through online computer searches in writing a reportabout the chemistry of natural products.	• iscussion Sessions • ssignments that require collecting information from the internet.	• ral presentations • riting
d2- Acquire independent study skills and problem solving in groups for continuing professional development needs.		
d3- Work in groups and manage his/her time		

III. Course Content:

A. Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Week	contact hours	ILOs
1	Volatile oils	Methods extraction , isolation identification , and biogenesis	1	2	a1,a2,a3,b2

2	Methods of extraction the volatile oils	Steam distillation , water distillation , dry-steam distillation , expression distillation , solvent extraction	1	2	a1,a2
3	Terpenes v oil and phenylproponoid v oil	Biosynthesis .definition, classification ,chemical test , general properties, uses and action	1	2	a1,d1,d2,d3
4	Plants containing drugs (Thyme , clove, chamomile)	Definition , classification .properties ,biosynthesis , pharmacological action and uses	1	2	b1,d2,d3
5	Glycosides	Definition , classification , extraction , purification , general properties, pharmacological action	1	2	a1,a2
6	Anthraquinone and glycosids	Definition , classification .properties ,biosynthesis , pharmacological action and uses	1	2	a1,a3,b3
7	Plants containing drugs (Senna leaf , cascara , frangula)	Definition , classification .properties ,biosynthesis , pharmacological action and uses	1	2	a3,b1,d2,d3
8	Mid-term	Mid-term Exam	1	2	
9	Saponin glycosides Plants containing drugs (Liquorice , quillia)	Definition , classification .properties ,biosynthesis , pharmacological action and uses	1	2	a1,a3,b3,d2
10	Coumarins and glycosides	Definition , classification .properties ,biosynthesis , pharmacological action and uses	1	2	a1,a2,a3,b3,d2
11	Flavonoids Plant containing drugs(Ginkgo , passiflora , tea leaf,Rutin , hesperidin , quercetin)	Definition, chemistry of flavonoids ,biosynthesis, classification, general properties, chemical tests, isoflavonoids, bioflavonoids, rotenoids.	1	2	a1,a3,b3, d1,d2
12	Tannins	Definition , classification. Toxicity, pharmaceutical uses and properties	3	6	a2,b3,d2
13	Bitter principles Bitter Glycosides, chromone. terpenes	Definition, classification, biosynthesis , properties, chemical test	1	2	A1,a3,b2, b3,d1
14	Final	Final-Exam	1	2	

Number of Weeks /and Units Per Semester	16	32	

Practical Aspect: (if any)

Order	Tasks/ Experiments	Number of Weeks	contact hours	ILOs
1	Introduction	1	2	c3
2	Saponineidentification and isolation	1	2	c1, c2
3	Tanninidentification and isolation	1	2	c1,c2
4	Anthraquininidentification and isolation	1	2	c1,c2
5	Flavonids identification and isolation	1	2	c1,c2
6	Coumarins identification and isolation	1	2	c1,c2
7	Volatile oils identification and isolation	1	2	c1c2
8	Volatile oils identification and isolation	1	2	c1,c2
9	Assay of bitter almond oil by Hydroxylamine method	1	2	c1,c2
11	Review	1	2	c1,c2,c3
12	Final – Exam	1	2	
Number of Weeks /and Units Per Semester		11	22	

IV. Teaching strategies of the **course**:

- Lectures
- Search topic and discussion sessions
- LAB Class
- Media Presentations: Power Point, Video
- Assignments

V. Assignments:

no	Assessment Tasks	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs(symbols)
1	**Participation, quizzes**	Each week	5	5%	a1, a2, a3, b1,c1,d3
2	**Research, assignments**	6th week	5	5%	a1, a5, b4, c3, d1,d3
3	**Mid – Exam (theoretical)**	7th week	20	20%	a1.a2,a3, b1,b2, d3
4	**Final Exam (practical)**	15th week	30	30%	a1.a2,a3, b1,b2, d1,d2,d3
5	**Final Exam (theoretical)**	16th week	40	40%	a1.a2,a3, b1,b2, d1,d2, d3
	Total		100	100%	

VI. Learning Resources:

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

1. Trease,CE and Evans,WC. Textbook of Pharmacognosy.11th to 14th Editions. Tindal L.U.K.
2. Priciples and Practice of Phytotherapy, Modern Herbal Medicine, Siman
3. Mills, Kerry Bone, Desmond Corrigan, James A. Duke and JanathanV.Wright, Churchill Living Stone (2000).

2. Recommended Readings and Reference Materials.

1. Atal,CK and Kappor,BM.Cultivation and Utilisation of Medicianl Plants.
2. . Wallis,TE. Textbook of Pharmacognosy,5thEdition,J&A,ChurchillLimited,U.K.
3. . Kokate,CKPurohit,AP. And Gokhale,SB.Pharmacognosy.
4. Walis T. A. “Textbook of Pharmacognosy”, S. K. Jain for CBS Publishers & Distributors, Jain

	Bhawan, BholaNath Nagar, Shahdara, Delhi-110032 (India), 5th Edition, 1967, 1985, 1997,2002, 2003, 2004, 2005 5. Chemistry of the Monoterpenes, an Encyclopedia Hand book, Part A & B 6. William F. Erman Marcel Dekker, INC (1985).
3. Essential References.	
	1. Tyler,VC,Brady,LR and Robers,JE.Pharmacognosy.,11th to 14th Editions; 2. Weiss R.F. and Fintelmann V. " Herbal Medicine", Thieme, Stuttgart, New York, 2nd Ed. (2000).
4. Electronic Materials and Web Sitesetc.	
	- http://www.botanical.com - http:/www.ansci.cornell.edu/plants/medicinal/
5. Other Learning Material.	
	- Laboratory instruments and equipments are needed - Data show projector
VII. Course Policies:	
١	**Class Attendance:** Absence from lectures and/or tutorials shall not exceed 25%. Students who exceed the 25% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college shall not be allowed to take the final examination and shall receive a mark of zero for the course.
٢	**Tardy:** Students should be attending the classes as its required for the assessments if the student is 15 minutes late in attending to the class for more than two classes he will loss 50% of quizzes mark.
٣	**Exam Attendance/Punctuality:** All examination and their roles will be according to Students affairs regulations
٤	**Assignments & Projects:** - Student who is submitting the assignments or the projects on time, will be awarded good percentage in grading of participation.
٥	**Cheating**: - All students must be an ideal behavior and respect each other, their teachers and respect the roles of the colleague. In addition, students should follow safety roles while working in the lab. Those who has been caught in any cheating case will be punished according to the Students affairs regulations
6	**Plagiarism**: Student will be punished depend upon gravity of the action and according to Students affairs regulations which might be ranged from rewriting the homework to suspension or dismissal
7	**Other policies:** - Using mobile or another electronic device capable to store or transfer data in class during the lecture or the exam is forbidden.

Course Specification

Pharmacology II

I. Course Identification and General Information:

1	**Course Title:**	**Pharmacology II**				
2	**Course Code &Number:**	**PH1123252**				
3	**Credit hours: 3**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2	0	1	0	3
4	**Study level/ semester at which this course is offered:**	Level 3/ semester2				
5	**Pre –requisite (if any):**	Pharmacology 1				
6	**Co –requisite (if any):**					
7	**Program (s) in which the course is offered:**	Bachelor of Pharmacy				
8	**Language of teaching the course:**	English				
9	**Location of teaching the course:**	Thamar University - Faculty of Medical Sciences				
10	**Prepared By:**	Dr. Ahmed G. Al- Akydy				
11	**Date of Approval**	2021				

II. Course Description:

This course continuation of the study of the properties, effects of the primary agents in the major drug categories, mechanism of action, pharmacokinetic, clinical use & toxicities. The first part of this course offers the student with the general knowledge on the common drugs affecting central nervous system (anxiolytics, hypnotics, antidepressants, antipsychotics, anticonvulsants, Parkinson's disease, Alzheimer's disease, local and general anesthetics, opioid analgesics). The second part deals with drugs affecting endocrine system (hypothalamic, and pituitary hormones, thyroid hormones and antithyroid drugs, pancreatic hormones & antidiabetic drugs, adrenocortical steroids, and sex hormones) and agents affecting calcium balance.

III. Course Objectives:

The overall aims of the course are:

1. To increase knowledge of student with the correct classification of drugs used in the treatment of CNS disturbances (such as, anxiety, depressant, Parkinsonism, seizures) and abnormal excess or deficiency of hormones.
2. To distinguish the mechanism, therapeutic uses, side effects/toxicity, contraindications, and interactions of the major classes acting on the CNS, and endocrine systems.
3. To apply this knowledge on clinical experience & research work.

IV. Course Intended Learning Outcomes (CILOs) :

Knowledge and Understanding:

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

After completing the course, the student will be able to:

a1 Classify the major drug categories as they relate to major disorders affecting central nervous, and endocrine systems.

a2 Explain in detail the mechanisms of action, therapeutic uses, contraindications and adverse effects of commonly prescribed drugs used in the treatment of CNS and endocrine disorders

a3 know the Differentiations between narcotic and non-narcotic analgesics based on their mechanism of action, clinical uses and adverse effects.

Knowledge and Understanding PILOs		Knowledge and Understanding CILOs	
After completing this program, students would be able to:		**After completing this course, students would be able to:**	
A1	Explain the fundamentals of general sciences and the basic and biomedical sciences and their relations to pharmacy profession.		
A2	Illustrate the fundamentals of social and behavioral sciences relevant to pharmacy, ethics of health care and its impact on their relationship with patients and other healthcare professionals.		
A3	Describe relationships between chemical structure of compounds of pharmaceutical and medicinal interest and biological activities	a1	Classify the major drug categories as they relate to major disorders affecting central nervous, and endocrine systems.
A4	Define basic principles of drug: target identification, design, informatics, and mechanisms of action	a2	Explain in detail the mechanisms of action, therapeutic uses, contraindications and adverse effects of commonly prescribed drugs used in the treatment of CNS and endocrine disorders
		a3	Know the Differentiations between opioid agonists and opioid antagonists based on their mechanism of action, clinical uses and adverse effects.

A5	Outline principles of clinical pharmacology, therapeutics and Pharmacovigilance.	a2	Explain in detail the mechanisms of action, therapeutic uses, contraindications and adverse effects of commonly prescribed drugs used in the treatment of CNS and endocrine disorders

Intellectual Skills :

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

b1 Compare between the different classes of drugs used in the treatment CNS and hormones deficiency or excess, based on their mechanism of action, pharmacological effects, therapeutic uses, adverse effects and contraindications.

b2 Select an appropriate management strategy, involving the proper dosage form, route of administration, and regimen, for patients with different clinical situations of CNS, and endocrine disorders.

b3 **Identify** the common serious problems related to drugs used in the treatment of CNS and endocrine disorders and effectively manage them.

Intellectual Skills PILOs		Intellectual Skills CILOs	
After completing this program, students would be able to:		After completing this course, students would be able to:	
B1	Classify the synthetic and natural drugs according to their mechanism of action, systemic effect, therapeutic uses, contraindication and toxicity	**b1**	**Compare** between the different classes of drugs used in the treatment CNS and hormones deficiency or excess, based on their mechanism of action, pharmacological effects, therapeutic uses, adverse effects and contraindications.
B2	Design risk reduction strategies to ensure patient safety and prevent medication errors, drug interaction, and adverse drug effects,		
B3	Solve problems to reduce drug therapy problems	**b3**	Identify the common serious problems related to drugs used in the treatment of CNS and endocrine disorders and effectively manage them.

B4	Select drug therapy regimen using mathematical, genomic, clinical pharmacokinetic and pharmacodynamics principles for optimizing the patient therapy and medication safety	**b2**	**Select** an appropriate management strategy, involving the proper dosage form, route of administration, and regimen, for patients with different clinical situations of CNS, and endocrine disorders.

Professional and Practical Skills

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

c1 **Calculate** dosage and dose regimen of drugs that are used in the treatment of different conditions of CNS and endocrine disorders**.**

c2 **Write** a legal prescription with clear instructions for use of the drugs in different clinical conditions of CNS and endocrine diseases

c3 **Apply** pharmacological principles for rational use of drugs in the management of diseases, that result from disturbances in functions of CNS and endocrine system.

c4 **Detect** and manage problems, such as, side effects and drug interactions, related to drugs that are used in the treatment of CNS and endocrine disorders.

Professional and Practical Skills PILOs		Professional and Practical Skills CILOs	
After completing this program, students would be able to:		After completing this course, students would be able to:	
C1	Handle the chemical, biological, and pharmaceutical materials safely		
C2	Operate different pharmaceutical equipment and instruments		
C3	Extract active substances from different sources.		
C4	Carry outpatient physical assessment.	c1	**Calculate** dosage and dose regimen of drugs that are used in the treatment of different conditions of CNS and endocrine disorders**.**
C5	Advise the patients and health care professionals for optimizing medicines use.	c2	**Write** a legal prescription with clear instructions for use of the drugs in different clinical conditions of CNS and endocrine diseases
		c3	**Apply** pharmacological principles for rational use of drugs in the management of diseases, that result from disturbances in functions of CNS and endocrine system.

Transferable (General) Skills :			
Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)			
d1 Communicate effectively through oral and written reports, during the course study.			
d2 Use the different sources to obtain information and knowledge to complete assigned tasks.			
Transferable (General) Skills PILOs		**Transferable (General) Skills CILOs**	
After completing this program, students would be able to:		After completing this course, students would be able to:	
D1	Communicate effectively and ethically with patients, public, and health care professionals.		
D2	Use information systems and computer softwares in order to enhance the delivery of pharmaceutical care,	d2	Use the different sources to obtain information and knowledge to complete assigned tasks.
D3	Work effectively individually and in a team	d1	Communicate effectively through oral and written reports, during the course study.
D4	Have the skills of decision-making and time management and lifelong learning		

V. Alignment Course Intended Learning Outcomes

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
a1	**Classify** the major drug categories as they relate to major disorders affecting central nervous, and endocrine systems.	• Lectures • Discussion Sessions • Assignments	• Periodic exam (Quizzes) • Evaluate assignments • Mid & final exam
a2	**Explain** in detail the mechanisms of action, therapeutic uses, contraindications and adverse effects of commonly prescribed drugs used in the treatment of CNS and endocrine disorders		
a3	**know** the differentiations between opioid agonists and opioid antagonists		

	based on their mechanism of action, clinical uses and adverse effects.		

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

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
b1	**Compare** between the different classes of drugs used in the treatment CNS and hormones deficiency or excess, based on their mechanism of action, pharmacological effects, therapeutic uses, adverse effects and contraindications	• Discussion Sessions • Problem solving • Group discussion • Assignments	• Oral presentations • Evaluate assignments • Mid & final exam
b2	**Select** an appropriate management strategy, involving the proper dosage form, route of administration, and regimen, for patients with different clinical situations of CNS, and endocrine disorders.		
b3	**Identify** the common serious problems related to drugs used in the treatment of CNS and endocrine disorders and effectively manage them.		

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

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
c1	**Calculate** dosage and dose regimen of drugs that are used in the treatment of different conditions of CNS and endocrine disorders**.**	• Discussion sessions • Assignments	• Oral presentations • Theory & Practical exams • LAB report • Evaluate assignments
c2	**Write** a legal prescription with clear instructions for use of the drugs in different clinical conditions of CNS and endocrine diseases		

c3	**Apply** pharmacological principles for rational use of drugs in the management of diseases, that result from disturbances in functions of CNS and endocrine system.		
c4	**Detect** and manage problems, such as, side effects and drug interactions, related to drugs that are used in the treatment of CNS and endocrine disorders.		

(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 through oral and written reports, during the course study.	• Discussion Sessions • Assignments that require collecting information from the internet.	• Oral presentations • Writing
d2	**Use** the different sources to obtain information and knowledge to complete assigned tasks.		

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Central Nervous System (CNS)	- Introduction to the Pharmacology of CNS Drugs - Opioid agonists & antagonists	1W	2	a1;a2; a3; b1; b2; b3; c1; c2; c3; d3; c4; d1
		- Drugs for degenerative disorders	1W		a1; a2; b1; b2; b3; c1; c2; c3; c4; d1
		- Anxiolytic & hypnotic drugs - Alcohol	1W	2	a1; a2; b1; b2; b3; c1; c2; c3; c4;d1
		- Antidepressants & drugs used for mania & bipolar disorder - Antipsychotic drugs	1W	2	a1;a2; b1; b2; b3; c1; c2; c3; c4; d1
		- Antiseizure drugs	1W	2	a1; a2; b1; b2; b3; c1; c2; c3; c4; d1
		- General anesthetic drugs	1W	2	a1; a2; b1; b2; b3; c1; c2; c3; c4; d1
		- Local anesthetic drugs.	1W	2	a1; a2; b1; b2; b3; c1; c2; c3; c4; d1
		- CNS Stimulant drugs	1W	2	a1; a2; b1; b2; b3; c1; c2; c3; c4;

					d1
2	Endocrine System	▪ Introduction - Hypothalamic & pituitary hormones	1W	2	a1; a2; b1; b2; b3; c1; c2; c3; c4; d1
		- Thyroid hormones & antithyroid drugs	1W	2	a1; a2; b1; b2; b3; c1; c2; c3; c4; d1
		- Antidiabetic drugs	1W	2	a1; a2; b1; b2; b3; c1; c2; c3; c4; d1
		- Adrenocortical steroids	1W	2	a1; a2; b1; b2; b3; c1; c2; c3; c4; d1
		▪ Sex hormones. ○ Estrogens and androgens ○ Contraceptives	1W	2	a1; a2; b1; b2; b3; c1; c2; c3;c4; d1
		- Agents affecting calcium balance	1W	2	a1; a2; b1; b2; b3; c1; c2; c3; c4; d1
Number of Weeks /and Units Per Semester			**14**	**28**	

B – Case Studies and Practical Aspect: (if any)

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	- Introduction - Experimental animals and their method of handling.	1	1	
2	- Source of drug information	1	1	
3	- Drug dosage forms	1	1	c1; c2
4	- Routes of drug administration	1	1	c1; c2
5	- Administration of drug to rabbit/mice by different routes	1	1	c1; c2
6	- Study of pharmacokinetics of drug on animal and human	1	1	c1; c3
7	- Determination of the acute toxicity of drug on animal to calculate LD50	1	1	c1; c4
8	- Effect of autonomic drugs on the eye	1	1	c2; c3; c4
9	- Effect of cholinergic agonists and antagonists on the smooth muscles of the rabbit's intestine.	1	1	c2; c3; c4
10	- Effect of adrenergic agonists and antagonists on the smooth muscles of the	1	1	c2; c3; c4

	rabbit's intestine.			
11	- Effect of neuromuscular blockers on the rectus abdominus	1	1	c2; c3; c4
12	- Study the effects of NSADs (analgesic, antipyretic, antiinflammatory) on animal and human	1	1	c2; c3; c4
Number of Weeks /and Units Per Semester		**12**	**12**	

VI. Teaching strategies of the course:

- Lectures
- Discussion sessions
- LAB Class
- Media Presentations: Power Point, Video
- Assignments
- Solving of problems

VII. Assignments:

No	Assignments	Mark	Week Due	Aligned CILOs(symbols)
1	Participation	2.5	Weekly	a1; a2; a3; b1; b2;c1; c2; c3; d1
2	Quizzes	2.5	Weekly	a1; a2; a3; b1; b2;c1; c3
3	Research	2.5	6th W	a1; a3; b1; b2; b3; c1; d1; d2
4	Assignments	2.5	6th W	a1; a2; a3; b1; b2;c1;c2; d2;

				d3
5	Mid – Exam (theoretical)	10	7th W	a1; a2; a3; b1; b2;c1; c3
6	Final Exam (practical)	30	15th W	a1; a3; b2; b3;c1; c2;c3
	Total score	**50%**		

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 & Homework, Tasks & Presentation	Fortnightly	5	5%	a1; a2; a3; b1; b2;c1;c2; d2; d3
2	Quizzes	W6	2.5	2.5%	a1; a2; a3; b1; b2;c1; c3
3	Mid-Term exam	W8	10	10%	a1; a2; a3; b1; b2; c1; c3
4	Practical reports	W12	2.5	2.5%	a1; b3; c2; c3; d2; d3; d4
5	Final exam practical	W 15	30	30%	a1; a3; b2; b3;c1; c2;c3
6	Final Exam theory	W16	50	50%	a1; a2; a3; b1; b2;c1c3
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).

	1) Katzung B.G., Trevor A.J., (2015). Basic & Clinical Pharmacology(13Ed); McGraw-Hill Education, New York. 2) Whalen K.; Feild C., Radhakrishnan R.(2019). Lippincott Illustrated Reviews Pharmacology, (7Ed). Wolters Kluwer, New York.
2- Essential References.	
	1) Ritter J.M., Flower R., Henderson G., Loke Y.K., Mac Ewan D. (2020). Rang and Dale's Pharmacology (9 Ed). Elsevier Ltd, United Kingdom. 2) Brunton L.L., Chabner B.A., Knollmann B.C. (2011). Goodman & Gilman's The Pharmacological Basis of Therapeutics (12 Ed). McGraw-Hill companies, Inc. New York.
3- Electronic Materials and Web Sites *etc*.	
	- http://www.jpharmacol.com - http://www.cvpharmacology.com - http://www.fda.gov