Biochemistry 1 Course Specification

I. Course Identification and General Information:

1	**Course Title:**	**Biochemistry 1**				
2	**Course Code &Number:**	**B1103226**				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		1		3
4	**Study level/ semester at which this course is offered:**	*Level 3 first semester*				
5	**Pre –requisite (if any):**	**B1102112**				
6	**Co –requisite (if any):**					
8	**Program (s) in which the course is offered:**	**Pharma D**				
9	**Language of teaching the course:**	**English**				
10	**Location of teaching the course:**	**Faculty of Medical Sciences, Thamar University**				
11	**Prepared By:**	**Dr. Abdulqawi Al-Shammakh**				
12	**Date of Approval**					

II. Course Description:

This course offers detailed study of the chemical compositions and the biological functions of the mai biochemical molecules including carbohydrates, proteins, lipids and their components, nucleic acids, vitamins and minerals. It also enables the students to apply chemical laboratory methods to detect an quantifying some biomolecules in practices part.

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 on the molecular composition of the cells and subcellular components.
A1	a2- Explain the basic concept of acid, base and buffer and their role in maintaining the pH in human body.
A1	a3- Describe chemistry of biomolecules (amino acid, protein, carbohydrate, lipid, nucleic acid and vitamin) their classifications, nomenclature, and biological functions.
A2	a4- Demonstrate knowledge and understanding on the principal and theory of the various tests he or she is performing in the clinical laboratory.

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- Integrate the knowledge of biochemistry with other biomedical sciences.

B1	b2- Compare and contrast the structural differences between carbohydrates, amino acids, protein and nucleic acids.
B2	b3- Interpret the result of biochemical test used to detect carbohydrates protein and lipids.
B3	b4- Create a safety checklist that identifies key elements of the following categories of hazards: biohazard, fire, chemical, electrical.

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:
C4	c1- Perform various procedures for the qualitative measure of carbohydrates proteins and lipids.
C4	c2- Prepare and label buffer solutions and used pH meter to measure the value of pH.
C4	c3- Estimate total protein, albumin blood sugar and lipids
C1	c4- Perform and monitor quality control and biosafety within predetermined limits.

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:
D7	d1-Develop awareness of the role and responsibilities of the medical laboratory technician as a member of the health care team.

D5	d2- Respect the faculty staff and friends and co-operate with others
D3	d3- Use scientific website to solve and prepare your assignment.
D2	d4- Demonstrating professional conduct and interpersonal communication skills with patients, laboratory personnel, other health care professionals.

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	Demonstrate knowledge and understanding on the molecular composition of the cells and subcellular components.	Active Lectures (supported with discussions)	Written exam, Quiz,
a2	Explain the basic concept of acid, base and buffer and their role in maintaining the pH in human body.	Active Lectures (supported with discussions)	Written exam, Quiz, homework
a3	Describe chemistry of biomolecules (amino acid, protein, carbohydrate, lipid, nucleic acid and vitamin) their classifications, nomenclature, and biological functions. and the important reactions of carbohydrates.	Active Lectures, Tutorial, electronic self-learning	Written exam Problem's evaluation Quizzes, assignment
a4	Demonstrate knowledge and understanding on the principal and theory of the various tests he or she is performing in the clinical laboratory.	Active Lectures (supported with discussions), 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	Integrate the knowledge of biochemistry with other biomedical sciences.	Problem solving , tutorial, group discussion	Assignment, oral exam, MCQ and written exam

b2	Compare and contrast the structural differences between carbohydrates, amino acids, protein and nucleic acids	Lecture, tutorial, electronic learning	Assignment, and written exam
b3	Interpret the result of biochemical test used to detect carbohydrates protein and lipids	Laboratory practices, brainstorm, case study	Laboratory report Case report, quiz
b4	Create a safety checklist that identifies key elements of the following categories of hazards: biohazard, fire, chemical, electrical.	Laboratory practices, lecture and discussion	Practical exam, laboratory report, Quiz and written exam
	(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	Perform various procedures for the qualitative measure of carbohydrates proteins and lipids.	**Laboratory practice, laboratory demonstration**	**Laboratory attendance,** **Laboratory report, practical exam**
c2	Prepare and label buffer solutions and used pH meter to measure the value of pH.	**Laboratory practice, laboratory demonstration**	**Laboratory attendance,** **Laboratory report, practical exam**
c3	Estimate total protein, albumin blood sugar and lipids	**Laboratory practice, laboratory demonstration**	**Laboratory attendance,** **Laboratory report, practical exam**
c4	Perform and monitor quality control and biosafety within predetermined limits.	**Laboratory practice,**	**Practical performance assessment, quality control reports,** **Practical exam**
	(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
d1	Develop awareness of the role and responsibilities of the medical laboratory technician as a member of the health care team.	**Laboratory practice**	**Laboratory attendance, practical exam,**
d2	Respect the faculty staff and friends and Co-operate with others	**Lecture, workshop participation, Seminar, group discussion**	**Classes and lab attendance, evolutionary report , assignment and presentation**
d3	Use scientific website to solve and prepare your assignment.	**Assignments, case study, electronic learning**	**Assignment report, presentation**
d4	Demonstrating professional conduct and interpersonal communication skills with patients, laboratory personnel, other health care professionals.	**Group discussion, presentation**	**Oral exam, seminar**

V- Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List Learning Outcomes	Learning Outcomes	Number of Weeks	contact hours
1	Biomolecules and cells	• Chemical molecules of life. • Cell biomembrane • Cells organelles • Prokaryotes and eukaryotes cells	a1	1	2
2	Water acid base and buffering system	-Water biological importance and chemical properties	a2, b1, d2	2	4

		-pH definition, acid and base, weak acids and their biological importance. -Buffer definition and strength, Biological buffer in human body			
3	Carbohydrates	Definition and Functions of carbohydrates, classification of carbohydrates, Monosaccharide structural aspects, classification, biological importance and chemical reaction Derivatives of monosaccharides. Disaccharide, oligosaccharide and polysaccharide, structure and function	a3,a4, b2, b3, d2, d3	2	4
4	Amino acids	Structure Classification, essential and non-essential, biological importance, chemical reaction and properties, non-proteinogenic amino acids	a3,a4,b2,b3,d2,d3	1	2

	Midterm exam		a1-a4, b1,b2,b3,d2,d3	1	2
5	Peptide and Proteins	Peptide bonds formation , classification biologically important peptides, protein classification, levels of protein structures, plasma proteins their role and function, clinical significance of plasma proteins	a3,a4,b2,b3	2	4
6	Lipids	chemistry of fatty acids and lipids, their biological functions, and their classifications	a1,a3,a4,b2,b3	2	4
7	Nucleic acids	Chemistry Nucleosides, nucleotides, structure of nucleic acids and their biological functions. DNA replication and protein synthesis	a3,a4, b2,d2,d3	2	4
8	Vitamins	chemical structure, different classes of vitamins, dialyrequirements and their relation to some diseases.	a3,a4,a,b2,d2,d3	2	4
	Final exam		a1-a4 ,b1, b2,b4,d2,d3	1	2
Number of Weeks /and				16	32

Units Per Semester				
Number of Weeks /and Units Per Semester				

B - Practical Aspect: (if any)

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	Introduction to laboratory and biosafety in the lab	1	2	c4, d1
2	Analysis of carbohydrates Molish test, Fehling's test, Benedict's test, Barfoed's test, Seliwanoff's test	2	4	c1, c2, b3,b4,d1,d4
3	Color reactions of proteins: Biuret Reaction, Ninhydrin Reaction, Modified Millon's Reaction, Sakaguchi Test for Guanidine Group. Precipitation test for proteins	2	4	c1, b3,b4, d1,d4
4	Midterm exam	1	2	c1,c2,c4,b3,b4, d1,d4
4	Colormetric assay for determination of total protein, albumin, glucose lipid and lipoproteins	4	8	c3,c4,b3,b4,d1, d4
5	Field visit	2	4	

	Final exam	**1**	**2**	**Midterm c1,c2,c4,b3,b4** **Final exam c1,c2,c4,b3,b4, d1,d4**
Number of Weeks /and Units Per Semester		**13**	**26**	

VI- Teaching strategies of the course:

The teaching strategies of the course will include the following methods

Active Lectures (supported with discussions), Tutorial, Problem solving, group discussion, electronic learning, practical session, and field visit

VII- Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Seminar	a5,b2,b3, d2,d5	6	2
3	Presentation	d2,d4,d5	8	3

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

8	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes

	Seminar		2	2%	d4,d3
	Presentation and assignment		3	3%	d2,d4,d5
1	oral		5	5%	b1,d2,d4
2	Midterm practical exam		10	10%	c1,c2,c4,b3,b4
3	Mid-Term Theoretical Exam		10	10%	a1-a4, b1,b2,b3
4	Logbook(Practical report)		10	10 %	d2,d1, b3
5	Final Practical Exam		20	20 %	c1,c2,c4,b3,b4, d1
6	Final theoretical exam		40	40%	a1-a4,b1, b2,b4
7	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- D M Vasudevan, (2019),Text book of Biochemistry for Medical Student, 9th edition Jaype Publishers, India.
2- Lieberman and Marks's,(2017) Marks' Basic Medical Biochemistry: A Clinical Approach, 5th edition, USA, Wolters Kluwer Health.
3- Satyanarayana U, (2019),Biochemistry,5th edition, Generic Publisher. India

2- Essential References.

1- Wilma D Silvia (2020),Competency Based Practical Biochemistry Textbook, 2nd edition,Pa Medical Publisher. India
2- David L. Nelson; Michael M. Cox, (2021),Lehninger Principles of Biochemistry, 8th editi
3- Michael A. Lieberman,(2019),BRS Biochemistry, Molecular Biology, and Genetics (Boa Review Series),Lippincott Williams & Wilkins, USA

3- Electronic Materials and Web Sites *etc*.

1- https://blog.feedspot.com/biochemistry_blogs/
2- http://www.csun.edu/~hcchm001/biosites.htm

	3- http://www.gwu.edu/~mpb/glycolysis3d.htm 4- https://blog.feedspot.com/biochemistry_blogs/

X- Course Policies:	
1	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. -
2	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 -
3	Exam Attendance/Punctuality: All examination and their roles will be according to Students affairs regulations
4	Assignments & Projects:Student, who is submitting the assignments or the projects on time, will be awarded good percentage in grading of participation.
5	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. -

Instrumental Analysis II Course Specification

Faculty : Faculty of Medical Sciences

Program :Bachelor of Pharma D

I. Course Identification and General Information:

١	**Course Title:**	**Instrumental Analysis**				
٢	**Course Code & Number:**	**PH1123126**				
٣	**Credit hours: 3**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		2		3
٤	**Study level/ semester at which this course is offered:**	3rd year 1st semester				
٥	**Pre –requisite (if any):**	**B1101223**				
٦	**Co –requisite (if any):**					
٨	**Program (s) in which the course is offered:**	**Bachelor of Pharma D**				
٩	**Language of teaching the course:**	**English**				
١٠	**Location of teaching the course:**	**Thamar University, Faculty of Medical Sciences**				
11	**Prepared By:**	**Dr: Abdulqawi Al-Shammakh**				
12	**Date of Approval**					

II. Course Description:

This course provides the student with the principles of instrumental analysis upon which modern measuring devices are based. This includes the exploration of the instrumental methods of analysis used to check the purity of raw material and quality control of pharmaceutical preparation; using chromatographic methods, spectroscopic methods; UV-Visible, IR, NMR and Mass spectroscopy.

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:
A4	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.
A1	a2-Explain the principle and applications of electrophoretic and chromatographic techniques in drugs identification and quantification.
A1,A4	a3- Enumerate the theories of evaluation and standardization of chemicals and pharmaceuticals substances using appropriate techniques and methodologies.

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:
B2, B4	b1- Design appropriate methods for evaluation of various chemical and pharmaceutical compounds.
	b2- Interpret and correlate instrumental methods in drugs identification and quantification.

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:
C2	c1- Employ different qualitative and quantitative methods for evaluation and standardization of active substances from different origins.
C1, C2	c2- Manipulate pharmaceutical instruments and equipments safely and efficiently and solve commonly encountered problems in pharmaceutical analysis.

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:

D3	d1- Work effectively as a part of a team to perform the required tasks
D4	d2- Implement writing and presentation skills and acquired long-life learning.

IV. 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 in the principle of the instrumental methods of analysis including potentiometry and spectroscopic methods; UV-Visible, IR, NMR and Mass spectroscopy.	Lectures + Classroom discussions Brain storming, problem solving	Quiz, written exam, homework Classroom worksheets
a2	Explain the principle and applications of electrophoretic and chromatographic techniques in drugs identification and quantification.	Animation + Lectures + Classroom Discussions Problem solving	Written exam, assignment, Oral exam
a3	Enumerate the theories of evaluation and standardization of chemicals and pharmaceuticals substances using appropriate techniques and methodologies.	lecture, group discussion, electronic learning, laboratory session, tutorial	Written exam, laboratory performance, 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	Design appropriate methods for evaluation of various chemical and pharmaceutical compounds.	Lecture, tutorial, laboratory session, Brainstorm	Written exam, Classroom worksheets lab report, quiz
b2	Interpret and correlate instrumental methods in drugs identification and quantification.	Case study, group discussion, lecture, laboratory session	oral examination, lab report, practical exam

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.	Laboratory practice, laboratory performance, quality control practice	Laboratory practical exam, laboratory report Classroom

			worksheets
c2	Manipulate pharmaceutical instruments and equipments safely and efficiently and solve commonly encountered problems in pharmaceutical analysis	Laboratory practice, laboratory performance, laboratory demonstration,	Laboratory report, practical exam, quality control reports,
	(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 effectively as a part of a team to perform the required tasks.	Laboratory session, group discussion Assignment Field work	oral exam, seminar, field work report
d2	Implement writing and presentation skills and acquired long-life learning.	electronic learning, workshop, class presentation	oral presentation, assignments, homework

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	Number of Weeks contact hours	Learning Outcomes
1	Introduction to Instrumental analysis	Introduction to Instrumental analysis	1	2	a1-a2
2	Potentiometry	Reference electrodes: Standard hydrogen electrode ,Saturated calomel electrode Indicator electrodes (glass electrode) Applications	1	2	a1, a3 b1,,d1
3	UV-Visible Spectroscopy	Electromagnetic radiation, lambert Beers's law Ultraviolet and visible light spectroscopy, Light scattering, Fluorescence spectroscopy and Atomic spectroscopy	3	6	a1, a3, b1,b2,d1,d2
4	Infrared Spectroscopy (IR)	Principle, methodologies and applications	2	4	a1,a3,b2
5	Midterm exam		1	2	a1, a3, b1,b2, d1,d2
6	NMR	Proton Nuclear Magnetic	2	4	a1,a3,b1,b2,

		Resonance Instrumentation, principle and application (1HNMR) + 13C NMR			d1,d2
7	Chromatographic	Basic principle and application, Adsorption (liquid–solid) chromatography Partition (liquid–liquid) chromatography Ion-exchange chromatography	2	4	a2,a3, b1,b2,d1,d2
8	Liquid Chromatography	HPLC Instrumentation, principles and applications	2	4	a2,a3, b1,b2,d1,d2
9	Mass spectrometry	Mass-to-Charge Ratio Mass spectrometers Principle and application	1	2	a1,a3, b1,b2,d1,d2
10	Final exam		1	2	a1-a3,b1-b2, d1-d2
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	Introduction to qualitative and quantitative methods	1	2	c1,b1, d1
2	Potentiometry Reference electrodes	1	2	c1,c2,b1,b2,d1
3	UV-Visible Spectrometry study the UV, Visible and to solve problems using Beer's-Lambert's law and identification of some drugs	2	4	c1,c2,b1,b2,d1
4	Identification of unknown chemical structures using IR	2	4	c1,c2,b1,b2,d1
5	Midterm exam	1	2	c1,c2,b1,b2,d1
6	Chromatographic analyze different compounds within a mixture	2	4	c1,c2,b1,b2,d1

5	Chromatographic: High Performance Liquid Chromatography (HPLC), analyze different compounds within a mixture, determination some drugs	3	6	c1,c2,b1,b2,dd1,d2
6	Field visit	2	4	c1,c2 d1,d2
7	Final exam	1	2	c1,c2,b1,b2,dd1,d2
8				
Number of Weeks /and Units Per Semester 15			**30**	

I. Teaching strategies of the course:

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

II. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Seminar on mass spectroscopy	A1, d1,d2	5,10	5
2	Lab report	b1-b2, c1-c2	Every week	5
3	Presentation	d1	6	5

III. 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%	d1
2	seminar	5,8	5	5%	d1,d2
3	Quizzes	3,6,10	5	5%	b1,a1
4	Midterm exam	8	10	10%	a1, a3, b1,b2, d1,d2
5	Midterm practical + Lab Report	7	10	10%	c1,c2,b1,b2,d1
6	Final Exam (theoretical)	16	40	50%	a1-a3,b1-b2, d1-d2
7	Final Exam (practical)	15	20	20%	c1,c2,b1,b2,dd1,d2
	Total		100	100%	

IV. Learning Resources:

-

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

1- Pharmaceutical Analysis, A Textbook for Pharmacy Students and Pharmaceutical Chemists, David G.Watson; last edition.
2- Principles of Instrumental Analysis - last Edition by Douglas A. Skoog, F. James Holler, and Stanley Crouch.
3- Fundamentals of Analytical Chemistry, 9th ed. Douglas,A. Skoog and Donald M. West.Sounder's College Publishing, Japan (2014).

2- Essential References.

1- Dean's Analytical Chemistry Handbook, Pradyot Patanik, 2nd ed., McGraw Hill, New Y (2004).
2- Analytical Chemistry, Gary D. Christian, 7th ed. John Wiely and Sons, New York (2013

3- Electronic Materials and Web Sites *etc*.

http://www.mediafire.com/download/tfw77m3ewhbte0s/Animation_Spectro_Photomultiplier.mp4

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 Medicinal Chemistry I

I. Course Identification and General Information:						
1	Course Title:	Medicinal Chemistry I				
2	Course Code &Number:	B1101336				
3	Credit hours:	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	Credit Hours
		2		1		3
4	Study level/ semester at which this course is offered:	3Level / 1st Semester				
5	Pre –requisite (if any):	Organic Chemistry II				
6	Co –requisite (if any):					
8	Program (s) in which the course is offered:	Bachelor of Pharm D				
9	Language of teaching the course:	English				
10	Location of teaching the course:	Faculty of health sciences				
11	Prepared By:	Associ. Prof Mokhtar Al-Ghorafi				
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 correlate physiochemical properties(ADME) of molecules with their molecular pharmacological activity (SAR).
2. To describe the chemistry of drug metabolism in the body.
3. Provide the basics of the concept of drug design as well as physicochemical parameters affecting drug action, absorption and bioavailability.
4. To understand the function of drugs affecting autonomic nervous system at the molecular level.

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 Explain the relationship between the structural activity relationship (SAR)and its pharmacokinetics and pharmacological activity.	a1,a3,a4
A2 Understand the chemistry of drug-receptor interaction and drug metabolism in 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 Discuss the structure activity relationships (SAR) that control the pharmacokinetics and pharmacodynamics	**b1**
B2 Predict the various pathways of drug	

receptor interactions based on the molecular structures.	

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. Use efficiently equipments and suitable methods for assay of drugs	c1,c2,c3
C2 Employ theoretical medicinal chemistry knowledge for the synthesis and purification of drugs	

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 Search efficiently for medical information from professional medical sites.	**d1 ,d3**
D2 Collaborate actively in groups with their colleagues	

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 Explain **the relationship between the** structural activity relationship (SAR)**and its pharmacokinetics and pharmacological activity.**	Lectures Discussions,	Quizzes Midterm Exam Final Written Exam
A2 Understand the chemistry of drug-receptor interaction and drug metabolism in the body	Lectures Discussions,	Quizzes Midterm Exam Final Written Exam

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

Course Intended	Teaching strategies	Assessment Strategies

Learning Outcomes		
B1 Discuss the structure activity relationships (SAR) that control the pharmacokinetics and pharmacodynamics	Lectures Discussions,	Quizzes -Midterm Exam Final Written Exam
B2 Predict the various pathways of drug receptor interactions based on the molecular structures.	Lectures Discussions	Quizzes -Midterm Exam Final Written Exam

(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. Use efficiently equipments and suitable methods for assay of drugs	Lectures. Lab Experiments	laboratory and other written reports Quizzes Final Practical Exam
C2 Employ theoretical medicinal chemistry knowledge for the synthesis and purification of drugs	Lectures. Lab Experiments	laboratory and other written reports Quizzes Final Practical Exam
(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
D1 Search efficiently for medical information from professional	Discussion Self-Learning	Oral discussion

medical sites.	Seminars	Discussion. Group work
D2 Collaborate actively in groups with their colleagues		

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 in Relation to Biological Action**	– … Solubility in water. – - Partition coefficient. – - Acid/ base partition. – - Bonding forces. – - Isosterism & Bioisosterism. – - Geometric isomers. – - Conformational Isomerism. – - Optical isomerism.	2	4	A1,A2
2	**The molecular properties of drugs**	– Acidity and basicity of drugs – Hydrophilic/Hydrophobic Properties of drugs – — Variation of Alkyl or Acyl Substituents to – vary polarity – — Variation of Polar Substituents to vary	1	2	A1,A2
3	**Drug design :Receptors as Drug Targets**	- Design of Agonists: - Binding Groups - Position of the Binding Groups - Size and Shape - Allosteric Modulators	1	2	A1,A2,B1,B2,C1
4	**Drug design**	— Design of Antagonists:	1	2	A1,A2,B1,B2

	:Receptors as Drug Targets	- Antagonists acting at the binding site - Antagonists acting out with the binding site - Antagonists as Molecular Labels - Partial Agonist			
5	**Prodrugs**	-Basic concepts. Prodrugs of functional groups	1	2	A1,A2
6	**Mid-Term Theoretical Exam**		1	2	A1,A2
7	**Drug metabolism**	• Introduction • Phase-I metabolism	1	2	
8	**Drug metabolism**	• Phase-II metabolism • Factors affecting drug metabolism	1	2	A1,B1
9	**Making Drugs More or Less Resistant to Enzymatic and Chemical Hydrolysis**	Steric Shield - Electronic Effects of Bioisostere - Stereoelectronic Modification Metabolic Blockers - Removal or Replacement of Susceptible Groups Bioisosteres of Polar Groups	1	2	A1,B1,B2
10	**Drugs acting on adrenergic receptors**	Adrenergic Drugs. Antiadrenergic Drugs	2	4	A1,B1,B2
11	**Drugs acting on cholinergic receptors**	Cholinergic Drugs. Anticholinergic Drugs	2	4	A1,B1,B2
12	**Final Theoretical Exam**	-MCQs and essay questions	1	2	A1,B1,B2,C2
Number of Weeks /and Units Per Semester		**15**		**30**	

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

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes (CILOs)	
1	Identification, limit test and assay of aspirin tablets		1	2	A1,B2,C2

2	Limit test for heavy metals	1	2	C1,C2
3	Limit tests for anhydrous sodium sulphate	1	2	C1,C2
4	limit test for chloride and sulfate by E.P.and B.P	1	2	C1,C2
5	Limit test for iron by E.P.and B.P	1	2	C1,C2
6	Limit test for lead by E.P.and B.P., limit test for arsenic by E.P.and B.P, Calculations	1	2	C1,C2
7	Limit tests and assay of sodium salicylate	1	2	C1,C2
8	Spectrophotometric determination of paracetamol	1	2	C1,C2
9	Spectrophotometric determination of aspirin	1	2	C1,C2
10	Spectrophotometric determination of ascorbic acid	1	2	C1,C2
11	Spectrophotometric determination of ibuprofen	1	2	C1,C2
12	Spectrophotometric determination of paracetmol	1	2	C1,C2
13	Spectrophotometric determination of antibacterial	1	2	C1,C2
14	Spectrophotometric determination of vitamins	1	2	C1,C2
15	- **Final Exam**	**1**	2	C1,C2
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. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Class attendance and participation	**a1,a2,b1,b2**	weekly	2.5
2	Homework, presentation	**a1,a2,b1,b2**	9	2.5

V. 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	1-12	5	**5%**	a1,a2,

2	Quizzes 1		5	2.5	2.5%	a1,a2, ,b1,b2
3	Mid-semester exam of theoretical part (written exam		7	10	10%	c1,c2,
	Quizzes 2		12	2.5	2.5%	c1,c2,
4	Lab. Term works	Attitude	1-10	5	A1,A2 ,B1,B3	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)		16	50	50%	a1,a2,b1,b2,c1, d1,d2
Total				100	100%	

V. 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	10th	5	5 %	A1,A2,
2	Mid-Term exam	8th	15	15 %	A1,A2, ,B1,B2
3	Practical reports	14th	5	5 %	C1,C2,
4	Final exam practical	15th	15	15 %	C1,C2,
5	Final Exam theory	15th	60	60%	A1,A2 ,B1,B3
Total			100	100%	

VI. Learning Resources:

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

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

1- . - An Introduction of Medicinal Chemistry, 5th edition, Graham Patrick, Oxford University Press, 2013.

Foye's Principles of Medicinal Chemistry, 7thedition, Thomas L. Lemke and David A. Williams, Lippincott Williams & Wilkins, 2013.

2- Essential References.

Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, 12th edition, J. N. Delgado and W. A. Remers, Lippincott-Raven, 2011.

3- Electronic Materials and Web Sites *etc.*

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

Microbiology II (pharmaceutical Microbiology)

I. Course Identification and General Information:							
1	Course Title:	Microbiology II					
2	Course Code &Number:	**B1101345**					
3	Credit hours: 3	C.H				Total	
		Th.	Seminar	Pr.	Tr.		
		2		1		3	
4	Study level/ semester at which this course is offered:	**level 3 semester 1**					
5	Pre –requisite (if any):						
6	Co –requisite (if any):						
7	Program (s) in which the course is offered:	PharmD					
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:
A 1		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
A 2		
A 3		
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:

C 1		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
C 2		
C 3		
C 4		
C 5		

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
c	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
c	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
d	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 pharma 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 Pharma 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. - Preservative stability and efficacy. Methods of Preservative evaluation and testing	3	4	
	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 &	2	4	

	vessels			
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 antibiotic Sensitivity for the given bacteria by plate and tube methods.	3	6	
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

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

. 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.	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*.

	-

Course Specification Pharmaceutics II

I. Course Identification and General Information:

1	**Course Title:**	Pharmaceutics II				
2	**Course Code &Number:**	**B1101355**				
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:**	PharmD				
8	**Language of teaching the course:**	English / Arabic				
9	**Location of teaching the course:**	Themar University				
10	**Prepared By:**	Dr. Abdulkarim Kassem Alzomor				
11	**Date of Approval**	**2021**				

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.

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 Describe the stages of designing 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.

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	Describe the stages of designing pharmaceutical aerosols, semisolid preparations and suppositories	a1	Describe the stages of designing pharmaceutical aerosols, semisolid preparations and suppositories
A3	Describe relationships between chemical structure of compounds of pharmaceutical and medicinal interest and biological activities	a2	Explicit the general properties, the types and roles of excipients, advantages and disadvantages of pharmaceutical aerosols, semisolid and suppositories dosage forms.

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:

b1 Classify pharmaceutical aerosols, semisolid preparations and suppositories.
b2 Design pharmaceutical aerosols, semisolid preparations and suppositories.

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**	Classify pharmaceutical aerosols, semisolid preparations and suppositories.
B2	Design risk reduction strategies to ensure patient safety and prevent medication errors, drug interaction, and adverse drug effects,	**b2**	Design pharmaceutical aerosols, semisolid preparations and suppositories.

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:

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.

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	c1	Handle efficiently and safely the chemical materials and tools used in the laboratory.
C2	Operate different pharmaceutical equipment and instruments	c2	Operate the instruments and prepare extemporaneous semisolid preparations and suppositories.

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:

d1 Communicate effectively and behave in discipline with colleagues.
d2 Participate efficiently with colleagues in a team work

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.	d1	Communicate effectively and behave in discipline with colleagues.
D3	Work effectively individually and in a team	d2	Participate efficiently with colleagues in a team work

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 Describe the stages of designing pharmaceutical aerosols, semisolid preparations and suppositories	- Lectures and Groups discussion. - Practical presentations - Self - learning	- Quizzes, Written exam.
a2	a2 Explicit the general properties, the types and roles of excipients, advantages and disadvantages of		

(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.	- Discussions and Training - Field visits - Problem solving	- Quizzes, Homework - Observation - Task's Evaluates
b2	Design pharmaceutical aerosols, semisolid preparations and suppositories.		

(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	Handle efficiently and safely the chemical materials and tools used in the laboratory.	- Discussions and Training - Field visits - Problem solving	- Quizzes, Homework - Observation - Practical exam
c2	Operate the instruments and prepare extemporaneous semisolid preparations and suppositories.		

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:			
Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
d1	Communicate effectively and behave in discipline with colleagues.	- Group discussions - Cooperative learning. - Self – learning - Inductive and deductive	- Homework - Evaluates of Oral Presentation
d2	Participate efficiently with colleagues in a team work		

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
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	a1, a2, b1, b2, d1
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	a1, a2, b1, b2, d2
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,	3	6	a1, a2, b1, b2, d1

		advantages, disadvantages, classification based on type of ointment base			
4	**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	a1, a2, b1, b2, c1, d1
5	**Suppositories**	- definitions, advantages, advantages, disadvantages, classification (rectal, vaginal) formulation, types of suppository bases, method of preparation	3	6	a1, a2, b1, b2, d2
6	**Course Review**	- Review of the course topics by discussion session.	1	2	a1, a2, b1, b2, d1, d2
Number of Weeks /and Units Per Semester			**14**	**28**	

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 2 % ointment in simple ointment base	1	2	c1,c2, , d1, d2
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	Revision	1	2	c1, c2, , d1, d2
Number of Weeks /and Units Per Semester		12	24	

VI. 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

VII. 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

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	1-12	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**	**10**	**10%**	**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	50	50**%**	**a1,a2,b1,b2,c1, d1,d2**
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. 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*.

Course Specification

Pharmacology 1

I. Course Identification and General Information:

1	**Course Title:**	**Pharmacology I**				
2	**Course Code &Number:**	**B1101361**				
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/ semester1				
5	**Pre –requisite (if any):**	Physiology				
6	**Co –requisite (if any):**	None				
8	**Program (s) in which the course is offered:**	Bachelor of Pharmacy Doctor (Pharma D)				
9	**Language of teaching the course:**	English				
10	**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

Faculty of Medical Sciences

Department of Pharmacy

Program of Bachelors Pharmacy

Course Specification of Phytotherapy

Course Code. (PH1124247)

2024

I. Course Identification and General Information:

1	**Course Title:**	*Phytotherapy*				
2	**Course Code & Number:**	**PH1124247**				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2				2
4	**Study level/ semester at which this course is offered:**	*3 level/ 1 semester*				
5	**Pre –requisite (if any):**	*Pharmacognosy and phytochemistry*				
6	**Co –requisite (if any):**					
7	**Program (s) in which the course is offered:**	*Bachelor of* ***Pharma D***				
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 campus*				
12	**Prepared By:**	*Dr. Abdulkarim Kassem Alzomor* *Dr. Aref Aiz Aldeen Al-Senway*				
13	**Date of Approval**					

II. Course Description:

The aims of this course is to provide students information about clinical effectiveness of herbs in the prevention and treatment of the diseases affecting respiratory systems ,heart and vascular system, CNS ,digestive ,and blood circulation as well as renal disorders also provide students information about traditional system and basic principles of complementary medicine

III. Intended learning outcomes (ILOs)

Course Intended Learning Outcomes		Program Intended Learning Outcomes	
a1	Know the basic principles of phytotherapy and diseases and the way of treatment by medicinal plants.	**A1**	knows the basic principles of pharmaceutical, medical, health & environmental sciences, as well as, pharmaceutical calculations.
a2	Identifies the physical and chemical properties and the relationship between the activity and toxic effect of the active ingredients.	**A4**	High accuracy identifies the physical & chemical properties & the toxic effects of various materials used in the preparation of medicines whether effective & ineffective.
a3	Correctly choose the methods of extraction of effective substances from plants.	**A7**	Correctly Choose of the ways of extraction of effective substances from the medical plants & the principles of alternative treatment.
a4	Determine the pathological condition ,symptoms and the medicine derived plant used in the treatment.	**A8**	High accurately, determines the pathological conditions & their symptoms & the medicines used in their treatment, as well as, the drug interactions & their side effects..
b1	Accurately suggest of the correct medicinal plants used for the treatment for various diseases.	**B2**	Accurately suggests of the correct choice of the drug treatment for various disease conditions according to the foundations of pharmacological therapy.
b2	Distinguish between the rational use or misuse for medicinal plants.	**B6**	Clearly distinguishes between the rational use or misuse and illegal for medicines & narcotic preparations
c1	Correctly uses the terminologies and abbreviations and others symbols.	**C2**	Applies the concepts of pharmacovigilance in the dispensing and the preparation, storage and distribution of medicines safely and effectively.
c2	Effectively communicate with patients and the healthcare team about the safety use of medicine.	**C5**	Effectively communicate, with patients and the healthcare team about the safety use of medicines.
d1	Works effectively with team,	**D1**	Works effectively in a unique team.

(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- Know the basic principles of phytotherapy and diseases and the way of treatment by medicinal plants. **a2-** Identifies the physical and chemical properties and the relationship between the activity and toxic effect of the active ingredients. **a3-** Correctly choose the methods of extraction of effective substances from plants. **a4-** Determine the pathological condition, symptoms and the medicine derived plant used in the treatment.	- Lectures and Groups discussion. - Practical presentations - Self - learning.	Quizzes, Written exam.

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Accurately suggest of the correct medicinal plants used for the treatment for various diseases. **b2-** Distinguish between the rational use or misuse for medicinal plants.	- 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. Correctly uses the terminologies and abbreviations and others	- Discussions and Training - Field visits	- Quizzes, Homework - Observation

symbols. **c2.** Effectively communicate with patients and the healthcare team about the safety use of medicine.	- Problem solving	- 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. Works effectively with team,	- Group discussions - Cooperative learning. - Self – learning - Inductive and deductive	- Homework - 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	**Introduction To CAM**	a1, a2,a3,a4, b1, b2, c1,c2,d1	Aim of the course traditional systems of herbal medicine Chinese, Ayurveda and Islamic	1	2
2	**Herbal medicine**	a1, a2,a3,a4, b1, b2, c1,c2,d1	pharmacological and therapeutical activity of the plants constituents	1	2
3	phytotherapy of disorders of respiratory system	a1, a2,a3,a4, b1, b2, c1,c2,d1	– hinitis definition ,symptoms ,causes and treatment – Sinusitis definition ,symptoms ,causes and treatment Cough definition ,symptoms	2	4

			,causes ,and treatment		
4	phytotherapy of disorders of heart and vascular disorders	a1, a2,a3,a4, b1, b2, c1,c2,d1	– Hypertension ,definition ,causes ,symptoms and treatment Varicose veins ,definition ,causes ,symptoms and treatment	1	2
5	phytotherapy of disorders of CNS	a1, a2,a3,a4, b1, b2, c1,c2,d1	Alzheimer and dementia definition ,causes ,symptoms and treatment	1	2
6	digestive system	a1, a2,a3,a4, b1, b2, c1,c2,d1	constipation ,definition ,causes ,symptoms and treatment Diarrhea,definition ,causes ,symptoms and treatment	1	2
7	Mid-term Exam			1	2
8	**Digestive system**	a1, a2,a3,a4, b1, b2, c1,c2,d1	– Gall Bladder definition ,types ,causes ,symptoms and treatments Liver diseases definition ,causes ,symptoms ,and treatments .	2	4
9	blood circulation	a1, a2,a3,a4, b1, b2, c1,c2,d1	anemia definition ,types ,causes ,symptoms and treatment Hypercholesterolemia,definition ,causes ,symptoms and treatment	1	2
10	renal infection	a1, a2,a3,a4, b1, b2, c1,c2,d1	– renal infection definition ,causes ,symptoms and treatment Inflammation ,stones causes ,symptoms and treatment	1	2
11	**Complementary medicine**	a1, a2,a3,a4, b1, b2,	Definition ,types ,massage therapy ,chiropractic therapy ,yoga ,yin and yang ,mind body therapy	2	4

		c1,c2,d1	,acupuncture therapy ,		
11	**Course Review**	a1, a2,a3,a4, b1, b2, c1,c2,d1	Review of the course topics by discussion session.	1	2
12	FINAL - EXAM			1	2
Number of Weeks /and Units Per Semester				**16**	**32**

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,a3,a4, b1, b2, c1,c2,d1	weekly	5
2	Homework, presentation	a1, a2,a3,a4, b1, b2, c1,c2,d1	11	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	10	**10%**	a1, a2,a3,a4, b1, b2, c1,c2,d1
2	Quizzes 1	**6**	**5**	**5%**	a1, a2,a3,a4, b1, b2, c1,c2,d1
3	Mid-semester exam of theoretical part (written exam	**8**	**20**	**20%**	a1, a2,a3,a4, b1, b2, c1,c2,d1
	Quizzes 2	**12**	**5**	**5%**	a1, a2,a3,a4, b1, b2, c1,c2,d1
7	Final exam of theoretical part (written exam)	16	60	60%	a1, a2,a3,a4, b1, b2, c1,c2,d1
Total			100	100%	

VIII. Learning Resources

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

1-Henrich M ,Barens j,and Gibbons S,A,2004"Fundamentals of pharmacognosy and phytotherapy",,Chrchill Livingstone ,New York.

2-Iqbal R .Phytotherapies ;efficacy ,safety ,regulation.2015 by John WILEY and Sons, Inc, Canada

2- Essential References.

1- Jean Bruneton ,2008, pharmacognosy ,phytochemistry,and medicinal plants 3rd ed

2- Brun L, and Cohen M,2010"Herbs and Natural supplements "2010 3rd ed ,Elsevier, London

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 Phytotherapy and complementary medicine Course Code. PH1124247

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:**	**Phytotherapy and complementary medicine**				
2-	**Course Number & Code:**	**PH1124247**				
3-	**Credit hours:**	**C.H**				**Total**
		Th.	**Seminar**	**Pr.**	**F. Tr.**	
		2				**2**
4-	**Study level/year at which this course is offered:**	*Fourth level/ 2nd semester*				
5-	**Pre –requisite (if any):**	**Pharmacognosy and phytochemistry**				
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:

The first topics in this course provides an introduction to the science and art of pharmaceutical dosage form design in particular knowledge in roles and types of excipients and also in the subsequent stages of design including preformulation, formulation and development. Then, the second topics of this course provides essential knowledge and skills for preparation of liquid dosage forms. The course is preceded by the course (Physical pharmacy) and (Pharmaceutical calculations) which are critical in comprehending the concepts in (Pharmaceutics courses).

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

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

a1- Know the basic principles of phytotherapy and diseases and the way of treatment by medicinal plants.
a2- Identifies the physical and chemical properties and the relationship between the activity and toxic effect of the active ingredients.
a3- Correctly choose the methods of extraction of effective substances from plants.
a4- Determine the pathological condition, symptoms and the medicine derived plant used in the treatment.
b1. Accurately suggest of the correct medicinal plants used for the treatment for various diseases.
b2- Distinguish between the rational use or misuse for medicinal plants.
c1. Correctly uses the terminologies and abbreviations and others symbols.
c2. Effectively communicate with patients and the healthcare team about the safety use of medicine
d1. Works effectively with team,

IV. Course Content:

- Distribution of Semester Weekly Plan of Course Topics/Items and Activities.

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours
1	**Introduction of CAM**	Aim of the course traditional systems of herbal medicine Chinese, Ayurveda and Islamic	1	2
2	**Herbal medicine**	pharmacological and therapeutical activity of the plants constituents	1	2
3	phytotherapy of disorders of respiratory system	**Rhinitis definition ,causes ,symptoms and treatment** **Sinusitis definition ,causes ,symptoms and treatment** Cough definition ,causes ,symptoms and	2	4

		treatment		
4	phytotherapy of disorders of heart and vascular disorders	– Hypertension definition ,causes ,symptoms and treatment Varicose veins definition ,causes ,symptoms and treatment	1	2
5	phytotherapy of disorders of CNS	Alzheimer and dementia definition ,causes ,symptoms and treatment	1	2
6	digestive system	constipation definition ,causes ,symptoms and treatment Diarrhea definition ,causes ,symptoms and treatment	1	2
7	Mid-term Exam		1	2
8	Digestive system	– Gall Bladder definition ,causes ,symptoms and treatment Liver diseases definition ,causes ,symptoms and treatment	2	4
9	**Blood circulation**	– anemia definition ,causes ,symptoms and treatment Hypercholesterolemia definition ,causes ,symptoms and treatment	1	2
10	**Renal infection**	– renal infection definition ,causes ,symptoms and treatment Inflammation ,stones definition ,causes ,symptoms and treatment	1	2
11	**Commentary medicine**	Definition ,types ,massage therapy ,chiropractic therapy ,yoga ,yin and yang ,mind body therapy ,acupuncture therapy ,	2	4
11	**Course Review**	Review of the course topics by discussion session.	1	2
12	Final Exam		1	2
Number of Weeks /and Units Per Semester			16	32

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	5
2	Homework, presentation	11	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	10	**10%**
2	Quizzes 1	**6**	**5**	**5%**
3	Mid-semester exam of theoretical part (written exam	**8**	**20**	**20%**
	Quizzes 2	**12**	**5**	**5%**
7	Final exam of theoretical part (written exam)	16	60	60%
Total			100	100%

IX. Learning Resources

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

1-Henrich M ,Barens j,and Gibbons S,A,2004"Fundamentals of pharmacognosy and phytotherapy",,Chrchill Livingstone ,New York.

2-Iqbal R .Phytotherapies ;efficacy ,safety ,regulation.2015 by John WILEY and Sons, Inc, Canada

2- Essential References.

1- Jean Bruneton ,2008, pharmacognosy ,phytochemistry,and medicinal plants 3rd ed

2- Brun L, and Cohen M,2010"Herbs and Natural supplements "2010 3rd ed ,Elsevier, London

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

I. Course Identification and General Information:

1	**Course Title:**	**Biochemistry 2**				
2	**Course Code &Number:**	**B1101327**				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		1		3
4	**Study level/ semester at which this course is offered:**	*Level 3, 2 semester*				
5	**Pre –requisite (if any):**	**B1102141**				
6	**Co –requisite (if any):**					
7	**Program (s) in which the course is offered:**	**MBBS, pharma D, laboratory medicine**				
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	3	6	a2, a3,a4 , b1,b2,b3,b4,d2,d3

		role in metabolism of amino acids, 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:

1	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. -
2	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 -
3	Exam Attendance/Punctuality: All examination and their roles will be according to Students affairs regulations
4	Assignments & Projects:Student, who is submitting the assignments or the projects on time, will be awarded good percentage in grading of participation.
5	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 Medicinal Chemistry II

I. Course Identification and General Information:						
1	**Course Title:**	**Medicinal Chemistry II**				
2	**Course Code &Number:**	**B1101337**				
3	**Credit hours:**	C.H				TOTAL Credit Hours
		Th.	Seminar	Pr	Tr.	
		2		1		3
4	**Study level/ semester at which this course is offered:**	3Level / 2nd Semester				
5	**Pre –requisite (if any):**	Organic Chemistry II				
6	**Co –requisite (if any):**					
8	**Program (s) in which the course is offered:**	Bachelor of Pharm D				
9	**Language of teaching the course:**	English				
10	**Location of teaching the course:**	Faculty of health sciences				
11	**Prepared By:**	Associ. Prof Mokhtar Al-Ghorafi				
12	**Date of Approval**					

II. Course Description:

This course aims to provide the student with the necessary basics knowledge in chemical structure and properties, structure-activity relationships, metabolism and therapeutic uses, of many drugs such as cardiovascular ,gastrointestinal tract ,analgesics ,central nervous system drugs, in addition to the pharmacokinetic and pharmacodynamic properties of the drugs based on the molecular structures.

III. Course Objectives:

- To develop an understanding of the physico-chemical properties of drugs.
- To understand the chemistry of drugs with respect to their pharmacological activity
- To know the structural activity relationship of different class of drugs.(cardiovascular ,gastrointestinal tract ,analgesics ,central nervous system drugs)
- Acquire the knowledge about the chemistry of biotransformation of different classes of drugs

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 Illustrate the structure activity relationships (SAR) of major drug groups and their relation to MOA in different systems	a1,a3,a4
A2 Identify drug receptor interaction and molecular effect of different drug classes.	

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 Explain the functional groups in drug structure responsible for activity and target binding.	b1
B2 Predict Chemical properties of drugs in different classes based on drug design.	

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 Use efficiently different chemical methods for assay of drugs	c1,c2,c3
C2 Handle and dispose chemical and pharmaceutical materials safely,	

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 course, students would be able to:**

D1 Retrieve information from a variety of sources, including libraries, databases and internet	**d1 ,d3**
D2 Collaborate actively in groups with their colleagues	

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 Illustrate the structure activity relationships (SAR) of major drug groups and their relation to MOA in different systems	Lectures Discussions,	Quizzes Midterm Exam Final Written Exam
A2 Identify drug receptor interaction and molecular effect of different drug classes.	Lectures Discussions,	Quizzes Midterm Exam Final Written Exam

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
B1 Explain the	Lectures	

functional groups in drug structure responsible for activity and target binding.	Discussions,	Quizzes -Midterm Exam Final Written Exam
B2 Predict Chemical properties of drugs in different classes based on drug design.	Lectures Discussions	Quizzes -Midterm Exam Final Written Exam

(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 Use efficiently different chemical methods for assay of drugs	Lectures. Lab Experiments	laboratory and other written reports Quizzes Final Practical Exam
C2 Handle and dispose chemical and pharmaceutical materials safely,	Lectures. Lab Experiments	laboratory and other written reports Quizzes Final Practical Exam
(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
D1 Retrieve information from a variety of sources, including libraries, databases and internet	Discussion Self-Learning Seminars	Oral discussion Discussion. Group work

D2 Collaborate actively in groups with their colleagues	Discussion Self-Learning Seminars	Oral discussion Discussion. Group work

Course Content: .V

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	**Cardiovascular drugs development**	Antihypertensive agents-An introduction Design and development of selective β_1 - antagonists (beta blockers) Angiotensin converting enzyme inhibitors (ACE inhibitors) Angiotensin II receptor antagonists Calcium channel blockers Direct acting vasodilator	3	6	A1,A2,B1,B2
2	**Diuretics**	Carbonic anhydrase inhibitors (CAIs) Loop diuretics Thiazide and thiazide-like diuretics Potassium-sparing diuretics Osmotic diuretics	1	2	A1,A2,B1,B2
3	**Drugs affecting the blood**	Anticoagulants & Coagulants. • Antiplatelet aggregation. • Antihyperlipidemic drugs • Drugs used for gout. •	1	2	A1,A2,B1,B2
4	**Midterm**		1	2	A1,A2,B1,B2
6	**Antihistamines**	Antihistamines 1	1	2	A1,A2,B1,B2
7	**Gastrointestinal**	Antihistamines H2	1	2	A1,A2,B1,B2

	tract	Drugs used for peptic ulcer • Antiemetic drugs. • Antidiarrheals and laxatives. •			
8	**Analgesics**	(NSAIDs & Opioids)	2	4	A1,A2,B1,B2
9	**Central nervous system**	Sedatives & hypnotics. • Antidepressants. • Antiepileptics drugs. • Antipsychotic • Treatment of parkinsonism & Alzheimer`s disease • Anaesthetics. •	3	6	A1,A2,B1,B2
10	**Final Theoretical Exam**	-MCQs and essay questions	1	2	A1,A2,B1,B2
12			15	30	
Number of Weeks /and Units Per Semester				**15**	

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

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Assay of cardiovascular drugs	2	4	C1,C2
2	Assay of diuretics	1	2	C1,C2
3	Assay of sodium benzoate	1	2	C1,C2
4	Identification and assay of indomethacin capsules	1	2	C1,C2
5	Identification and assay of ascorbic acid tablets	1	2	C1,C2
6	Identification and assay of metronidazole tablets	1	2	C1,C2
7	Assay of statines	2	4	C1,C2
8	Assay of diphenhydramine	1	2	C1,C2
9	Assay of rantidine	1	2	C1,C2
10	Assay of CNS drugs	3	6	C1,C2

11	- **Final Exam**	**1**	2	C1,C2
Number of Weeks /and Units Per Semester			**15 weeks**	

VI. Teaching strategies of the course:

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

VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Class attendance and participation	**a1,a2,b1,b2**	weekly	2.5
2	Homework, presentation	**a1,a2,b1,b2**	9	2.5

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		1-12	5	5%	a1,a2,
2	Quizzes 1		5	2.5	2.5%	a1,a2, ,b1,b2
3	Mid-semester exam of theoretical part (written exam		7	10	10%	c1,c2,
	Quizzes 2		12	2.5	2.5%	c1,c2,
4	Lab. Term works	Attitude	1-10	5	A1,A2 ,B1,B3	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)		16	50	50%	a1,a2,b1,b2,c1, d1,d2
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- . - An Introduction of Medicinal Chemistry, 5th edition, Graham Patrick, Oxford University Press, 2013.

Foye's Principles of Medicinal Chemistry, 7thedition, Thomas L. Lemke and David A. Williams,

	Lippincott Williams & Wilkins, 2013.
2- Essential References.	
	Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, 12th edition, J. N. Delgado and W. A. Remers, Lippincott-Raven, 2011.
3- Electronic Materials and Web Sites *etc*.	
	https://guides.library.vcu.edu/c.php?g=47681&p=298306 http://www.phc.vcu.edu/othercoolsites.html ttp://pharmacy.creighton.edu/

Course Specification First Aid

I. Course Identification and General Information:

1	**Course Title:**	First Aid				
2	**Course Code &Number:**	**B1102232**				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		1		1		2
4	**Study level/ semester at which this course is offered:**	**2 Level 3 Semester**				
5	**Pre –requisite (if any):**					
6	**Co –requisite (if any):**					
7	**Program (s) in which the course is offered:**	**Pharma D**				
8	**Language of teaching the course:**					
9	**Location of teaching the course:**					
10	**Prepared By:**					
11	**Date of Approval**					

II. Course Description:

This course covers the basic principles and objectives of first aid. In addition to how to first aid the patient from a number of emergency accidents Such as fractures, burns, hemorrhage, shock, suffocation and others. Using problem solving methods and creative thinking. This course aims to enable students to acquire the necessary knowledge to apply the principles of first aid.

And the use of problem-solving methods and creative thinking through lectures. Theory and use of educational models. Understand the roles and duties of a lifesaver. and assessment of physical damage (physical) resulting from accidents

III. Course Objectives:

This course aims to provide students with:

1. To enable the student to gain skills in emergency and blood collection.
2. Acquired knowledge of the basic first aid.
3. Understand the principles on which the first aid treatment base.

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:

al -Principals of basic management, purpose, general rules, and limitations of first aids.

a2- Principals of normal and abnormal bodily functions in healthy and diseased states.

a3. Principals of body anatomy and function to perform first aid measures and initial therapy for injured and acutely ill patient

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

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:

b1. Recognize the relationship between human body systems, safe and effective use of medicine.

b2. Recognize Purpose, Limitations, General Rules And proper application of first-aid

b3. Select and assess appropriate methods of first aid to save life, prevent further injury, and limit infection.

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

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:

c1. Apply the principals and guidelines for the treatment of shock, bleeding, burns, and fractures; methods of resuscitation; and methods of moving injured persons.

c2. Assess drug interaction, drug –food interaction and proper indication of drugs during first aid treatment

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

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:

d1- Manage time effectively

d2- Provide good advice about balanced diet to promote the efficiency of medication and give hand in poisoning cases.

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

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
al -Principals of basic management, purpose, general rules, and limitations of first aids. a2- Principals of normal and abnormal bodily functions in healthy and diseased states. a3. Principals of body anatomy and function to perform first aid measures and initial therapy for injured and	- Discussion Sessions - Assignments that require collecting information from the internet	- Writing Exam - Semester activities - Final Exam

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Recognize the relationship between human body systems, safe and effective use of medicine. b2. Recognize Purpose, Limitations, General Rules And proper application of first-aid b3. Select and assess appropriate methods of first aid to save life, prevent further injury, and limit infection.	- lectures (L) - Small group discussion	- Oral presentations - Evaluate assignments - Mid& final exam

(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 the principals and guidelines for the treatment of shock, bleeding, burns,	- Solving of some clinical	- Oral presentations - LAB report

and fractures; methods of resuscitation; and methods of moving injured persons. c2. Assess drug interaction, drug –food interaction and proper indication of drugs during first aid treatment	cases. - Presentations - Practical course	- Midterm exams - Practical exam - 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- Manage time effectively d2- Provide good advice about balanced diet to promote the efficiency of medication and give hand in poisoning cases	- Discussion Sessions - Assignments that require collecting information from the internet	- Oral presentations - Semester activities

V. Course Content:

A. Theoretical Aspect:

Order	Topics List	Sub-topics List	No of Weeks	Contact Hours	ILOS
1	**Definition of first aids** **The aim of first aids**	• Definition of first aids • The aim of first aids	1	2	a1- a3, b1, b2
2	**Hemorrhage and wounds.**	• External bleeding. • Internal bleeding.	1	2	a1-a3, b2, b3
3	**Shock** .	• Definition, types. • First aid treatments	1	2	a2, a3, b2, b3
4	**Unconsciousness:**	• Definition, • first aid and treatment	1	2	a2, a3, b2, b2
5	**Epileptic fits:**	• Definition, • first aid and treatment	1	2	a2, a3, b1, b2
6	**Splits and bandage:** .	• Aims of bandage in first aid. • Aims of splinting in first aid.	2	4	a2, a3, b2, b3,

		• Methods of apply bandages			d1
7	**Fracture and dislocation:**	• Definition, types, signs, and symptoms, the first aid and treatments. • Definition of dislocation, the first aid treatments.	**1**	2	a2, a3,b2, b3
8	**Burns and scalds:**	• Heat burns and chemical scalds. • First aid and treatments	**1**	2	a2, a3, b2, b3, d1, d2
9	**Management of laboratory accidents:**	• Infections, burns, cults, harmful fumes inhalation, • chemical and explosions • injuries, and electric shocks	**2**	4	a2, a3, b2, b3, d1
10	**Asphyxia and C.R.P.**	• Artificial respiration	**1**	2	a1- a3, b2, b3, d1, d2
11	**Poisoning and Vital signs**	• Poisoning • Vital signs	**2**	4	a2, a3, b2, b3, d2
Number of Weeks /and Units Per Semester			**14**	**28**	

B. Practical Aspect:

Order	Tasks/ Experiments	No of Weeks	Contact Hours	ILOS
1	Application of ABCs roles	2	**4**	c1, c2
2	Wounds and how to stop bleeding	2	**4**	c1, c2
3	Burns	1	**2**	c1, c2
4	Fractures	1	**2**	c1, c2
5	Shock and IV fluids	1	**2**	c1, c2
6	Preparation of antiseptics and disinfectants and their uses	1	**2**	c1, c2

7	Certain medications used in emergency such as analgesics, antibiotics	1	**2**	c1, c2
8	Different types if injections: iv bolus, infusion, push etc	1	**2**	c1, c2
9	Different types if injections: im, sc, id etc	2	**4**	c1, c2
Number of Weeks /and Units Per Semester		**12**	**24**	

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	
2	Quizzes	2.5	Weekly	
3	Research	2.5	6th W	
4	Assignments	2.5	6th W	
5	Mid – Exam (theoretical)	10	7th W	
	practical	20	15th W	
	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	7.5	7.5%	a1; a2; a3; b1; b2;c1;c2; d2
2	Quizzes	W6	2.5	2.5%	a1; a2; a3; b1; b2;c1
3	Mid-Term exam	W8	10	10%	a1; a2; a3; b1; b2; c1
4	Practical reports and Med Pract. Exam	W12	10	10%	a1; b3; c2d2
5	Final exam practical	W 15	20	20%	a1; a3; b1; b3;c1;
6	Final Exam theory	W16	50	50%	a1; a2; a3; b1; b2;c1
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. Bailey & Love. short practice of surgery Latest edition.
2. Terry, N. Current surgical diagnosis and treatment, Latest edition.
3. Browse, L; An introduction to symptoms and signs of surgical disease, Latest edition.

2- Essential References.

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:**	**B1101346**				
٣	**Credit hours: 3**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		`1		3
٤	**Study level/ semester at which this course is offered:**	**Level 3 semester 2**				
٥	**Pre –requisite (if any):**	Medical Biology				
٦	**Co –requisite (if any):**					
٨	**Program (s) in which the course is offered:**	*Bachelor Degree Course: Laboratory Medicine, Pharm. D. and Nursing*				
٩	**Language of teaching the course:**	*English*				
١٠	**Location of teaching the course:**	*Building B, Faculty of Medical Sciences, Thamar University Main Campus.*				
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	1	2	a1-a7;

		T. solium, Cysticercosis - Hydatid disease: *Echinococcus* sp. - Hymenolepiasis: *Hymenolepis nana*, *H. diminuta* - *Dipylidium caninum*, *Diphyllobothrium latum* and sparganosis			b2,b4
7	**Midterm Exam.**				
8	**Amoebae**	- *Entamoeba histolytica* - *Acanthamoeba* species - *Naegleria* species - Differentiation of cysts of non-pathogenic species of amoebae that can be found in faeces.	1	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.**				
Number of Weeks /and Units Per Semester					

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				

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

Course Specification Pharmaceutics III

I. Course Identification and General Information:

1	**Course Title:**	Pharmaceutics III				
2	**Course Code &Number:**	**B1101356**				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr.	Tr.	
		2		2		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):**					
8	**Program (s) in which the course is offered:**	PharmD				
9	**Language of teaching the course:**	**English / Arabic**				
10	**Location of teaching the course:**	Themar University				
11	**Prepared By:**	Dr. Abdulkarim Kassem Alzomor				
12	**Date of Approval**	2021				

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. Course Objectives:

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 Describe the stages of designing pharmaceutical solid and sterile dosage forms
a2 Explicit the general properties, the types and roles of excipients, advantages and disadvantages of pharmaceutical solid and sterile dosage forms .

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	Describe the stages of designing pharmaceutical solid and sterile dosage forms	a1	Describe the stages of designing pharmaceutical solid and sterile dosage forms
A3	Describe relationships between chemical structure of compounds of pharmaceutical and medicinal interest and biological activities	a2	Explicit the general properties, the types and roles of excipients, advantages and disadvantages of pharmaceutical solid and sterile dosage forms .

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:

b1 Classify pharmaceutical solid and sterile dosage forms .
b2 Design pharmaceutical solid and sterile dosage forms.

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**	Classify pharmaceutical solid and sterile dosage forms .
B2	Design risk reduction strategies to ensure patient safety and prevent adverse drug effects, medication errors, drug interaction, and adverse drug effects	**b2**	Design pharmaceutical solid and sterile dosage forms.

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	Handle the chemical, biological, and pharmaceutical materials safely	c1	Handle efficiently and safely the chemical materials and tools used in the laboratory.
C2	Operate different pharmaceutical equipment and instruments	c2	Operate the instruments and prepare extemporaneous pharmaceutical solid and sterile dosage forms.

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	Communicate effectively and ethically with patients, public, and health care professionals	**d1**	**Communicate effectively and behave in discipline with colleagues.**
D3	Work effectively individually and in a team	**d2**	**Participate efficiently with colleagues in a team work**

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. Describe the stages of designing pharmaceutical solid and sterile dosage forms .	- Lectures and Groups discussion. - Practical presentations - Self - learning.	- Quizzes, Written exam
a2	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 Skillsto Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
c1	Handle efficiently and safely the chemical materials and tools used in the laboratory.	-Discussions and Training - Laboratory lecture and work - Problem solving	- Quizzes, Homework - Observation and lab report - Lab exam
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 in discipline with colleagues.	- Group discussions - Cooperative learning. - Self – learning - Inductive and deductive	- Homework - Oral Presentation
d2	Participate efficiently with colleagues in a team work.		

VI. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	**Solid dosage forms: (1) Introduction & Powders**	**- Introduction** o classifications of dosage forms o Advantages and disadvantages o Formulation consideration **- Powders** o Definitions, advantages, disadvantages o classification (coarse,	2	4	a1, a2, b1, b2

		fine, micro fine, etc; divided, bulk; compounded; medicated, cosmetic) o Formulation considerations o Bulk powder, divided powder and Dusting powder:: formulation, examples o Powders problems & overcome o Powders packaging o Quality control evaluation			
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	a1, a2, b1, b2,d2
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	4	8	a1, a2, b1, b2, c1, d1

4	**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. - Soft gelatin capsule formulation. - capsule filling process - specific properties:O2 impermeability, water content	3	6	a1, a2, b1, b2, c2,d1
5	**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	a1, a2, b1, b2, d2
6	**Sterile pharmaceutical dosage forms** **(Parenteral preparations)**	- Preformulation factors o Route of administration of injection o Water for injection o Non-aqueous vehicles - Formulation consideration o Formulation of Infusion fluids - Prefilling , filling and package (small and large sacle) o Quality evaluation	2	4	a1, a2, b1, b2, d1
7	**Sterile pharmaceutical**	• Anatomical features of the eye • Types of ophthalmic	1	2	a1, a2, b1, b2, d1

	dosage forms (Ophthalmic preparations)	preparations • Formulation considerations • Sterilization and preservation. • Package • Quality evaluation			
Number of Weeks /and Units Per Semester			**14**	**28**	

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 method : paracetamol tablets	**1**	**2**	c1,c2, , d1, d2
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	Revision	1	2	c1,c2d1, d2
Number of Weeks /and Units Per Semester		**12**	**24**	

VII. 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

VIII. 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

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,d2
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,c1, d1,d2
	Quizzes 2		**12**	**2.5**	**2.5%**	a2, b1, b2, c1, d1, d2
4	Lab. Term works	Attitude	1-11	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)		16	50	f0**%**	a1,a2,b1,b2,c1, d1,d2
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. 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: Lippinc
2. Patrick J. Sinko (2006). Martin's Physical Pharmacy and Pharmaceutical Sciences.

3- Electronic Materials and Web Sites *etc*.

Course Specification

Pharmacology 2

I. Course Identification and General Information:

1	**Course Title:**	**Pharmacology 2**				
2	**Course Code &Number:**	**B1101362**				
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):**	Physiology				
7	**Program (s) in which the course is offered:**	Bachelor of Pharmacy Doctor (Pharma D)				
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