

University: Thamar

Faculty: Medical Sciences

Program: Medical lab, Nursing & Pharma D

Course Specification

I. Course Identification and General Information:					
1	Course Title:	General Anatomy			
2	Course Code & Number:	B1101225			
3	Credit hours: 14	C.H			TOTAL
		Th	Semina r	Pr	
		2		2	
4	Study level/ semester at which this course is offered:	2 year / First semester			
5	Pre –requisite (if any):	Nil			
6	Co –requisite (if any):	Nil			
7	Program (s) in which the course is offered:	Bachelor of Medical lab, Nursing & Pharma D			
8	Language of teaching the course:	English			
9	Location of teaching the course:	Thamar University			
10	Study System	Attendance			
11	Prepared By:	Ass.Prof.Dr.Saleh Nasser Saleh Alkardae			
12	Name of faculty member responsible for the course	Ass.Prof.Dr.Saleh Nasser Saleh Alkardae			
13	Date of Approval				

II. Course Description:

This course provides a core body of scientific knowledge concerning the normal structure and function of the human body at the level of organ and organ system. The student must be familiar with bones, muscles, joints, blood vessels and nerve. The emphasis will be placed on, but not limited to, the hierarchy of structural organization, medical terminology, musculoskeletal, cardiovascular, and respiratory systems as well as system relationships. It will provide the foundation to prepare the student for upcoming courses and practical experiences.

III. Course Objectives:

1. Explain the organization of the human body.
2. Recognize the major anatomical structures of the human body.
3. Describe the systems and processes involved in maintaining life and homeostasis in the human body.

A) 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	Correlate the function of organs within the system with anatomy	b1	Correlate the function of organs within the system with anatomy
b2	Interprets some clinical findings in relation to anatomical landmarks	b2	Interprets some clinical findings in relation to anatomical landmarks

B) 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	Show the anatomical parts of different body systems and their relations on plastic models and cadavers	c1	Show the anatomical parts of different body systems and their relations on plastic models and

			cadavers
c2	Draw various courses of the nerves & blood vessels	c2	Draw various courses of the nerves & blood vessels

C) 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 Use information technology as a mean of communication, for data collection and analysis, and for self-directed learning	d1 Use information technology as a mean of communication, for data collection and analysis, and for self-directed learning
d2 Communicate with his colleagues, professors, instructors in a scientific way in the science of anatomy.	d2 Communicate with his colleagues, professors, instructors in a scientific way in the science of anatomy.

IV. 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
a 1	<ul style="list-style-type: none"> - Lectures - Multimedia - Reading - Illustration - Discussions 	<ul style="list-style-type: none"> - Lectures - Multimedia - Reading - Illustration - discussions
a 2	<ul style="list-style-type: none"> - Lectures - Multimedia - Reading - Illustration - Discussions 	<ul style="list-style-type: none"> - Lectures - Multimedia - Reading - Illustration - discussions

V. Course Intended Learning Outcomes (CILOs)

D) 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	Define the Anatomical terms, osteology, Muscles, ligaments, tendons, Joint, fascia, Blood vessels and lymphatics.	a1.	Define the Anatomical terms, osteology, Muscles, ligaments, tendons, Joint, fascia, Blood vessels and lymphatics.
a 2	Describe the nervous system, respiratory system, gastrointestinal system, reproductive system, urinary system, endocrine system.	a 2	Describe the nervous system, respiratory system, gastrointestinal system, reproductive system, urinary system, endocrine system.

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
	Teaching strategies	Assessment Strategies
b1	<ul style="list-style-type: none"> - Interactive Lecture - Exercises - Discussions - Problem-Solving - Brainstorming 	<ul style="list-style-type: none"> - Written Examinations. - Problem-Solving Exercises.
b2	Interactive Lecture Exercises Discussions Small-Group Learning Problem-Solving.	Recall/Factual Questions in Written exams, Oral evaluations, OSPE, Assignments, Quizzes

(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course (ILOs)	Teaching strategies	Assessment Strategies

C1	<ul style="list-style-type: none"> - Audiovisual & lab sessions - Presentations - Multimedia 	<ul style="list-style-type: none"> - Active class participation - Assignments
C2	<ul style="list-style-type: none"> - Practical Sessions - Exercises - Discussions - Problem-Solving - Individual/Group Project 	<ul style="list-style-type: none"> - Written Examinations - Individual/Group Project - Technical/Practical Reports /Presentations

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

Course (ILOs)	Teaching strategies	Assessment Strategies
D1	<ul style="list-style-type: none"> - Sessions - Presentations - Multimedia 	<ul style="list-style-type: none"> -Students activity - Assignments
D2	<ul style="list-style-type: none"> - Guided Individual Reading /Self Learning. - Presentation - Small-Group Learning 	

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	No of Weeks	contact hours	Learning Outcomes (CILOs)
1	General introduction to Anatomy	General body organization and anatomical terminology body planes and cavities	1	2	a1,a2,b1,b2,c1,c2,d1, 2
2	Bones, Skeletal Tissues, The Skeleton, Joints	Structure, Skeletal Tissues Functions, Classification of Bone. Anatomy of long bone. Axial v.s appendicular skeleton.	2	4	a1,,b2,c1,c2,d1,
3	Muscles, Muscle	Structure, Types, Characteristics, Function	1	2	a1,a2,b1 ,c2,d1,

	Tissues, The Muscular System	Skeletal Muscle, Smooth Muscle, Cardiac Muscle Muscle System/Naming of Muscles			
4	Cardiovascular system & Lymphatic System & Body Immunity	Blood vessels – large sized artery. Medium sized artery -large vein - Medium vein lymphatic vessels ,nodes, palatine tonsil, thymus & Spleen.	1	2	a1,a2,b1,b2,c1,c2,d1
5	Mid-term Exam		1	2	a1,a2,b1,b2,c1,c2
7	Digestive system	The components of GIT mouth, pharynx, esophagus, Stomach - fundus and pylorus. Small intestine -duodenum, jejunum & ileum; Large intestine – colon and appendix. Accessory digestive organs include the teeth, tongue, salivary glands, liver, gallbladder, and pancreas.	2	2	a2, b2,c1,c2,d1
8	Respiratory System	consists of the nose, pharynx (throat), larynx (voice box), trachea (windpipe), bronchi, lungs and diaphragm.	1	2	a1,a2,b1,b2,c1,c2,d1
9	Uro-genital Systems	kidneys. Nephrons - cortical & juxtamedullary. Juxta glomerular apparatus Ureter, urinary bladder Male reproductive system testes Female reproductive system : Structure of ovary & Uterus	1	2	a1,a2,b1,b2,c1,c2,d1
10	Nervous system	The general organization of the central nervous tissue, the basic anatomical organization of the nervous system Spinal cord; Brain Stem. Cerebellum. Cerebral hemispheres – Autonomic nervous system	2	4	a1,,b2,c1,c2,d1,
11	Endocrine system	-Thyroid & parathyroid -Pituitary -Suprarenal	1	2	a2, b2,c1,c2,d1

		gland. -Pancreas.			
12	Growth	Gametogenesis - spermatogenesis and oogenesis, fertilization implantation, germ layer formation, fetal membranes and placenta.	1	1	1 1 a2, b2,c1,c2,d1
14	- Final exam		1	2	a1,a2,b1,b2,c1,c2,d1,d2
Number of Weeks /and Units Per Semester 15 weeks				30	

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

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Anatomical terms and osteology	2	4	a2,c1,d1,
2	Muscles, ligaments and tendons. Joint and fascia	1	1	a1,a2,b1,b2,c1,d1
3	The Integumentary System	1	2	a1,b1,c1,,d1,d2
4	Midterm practical exam	1	2	a1,a2,,b1,b2,c1,c2,d1,d2
5	Heart, Blood vessels and lymphatic's	2	2	a1,b1,c1,,d1,d2
6	Gastrointestinal system	2	4	a2,b1,b2,c1,d1
7	Nervous system	2	4	a1,b1,c1,,d1,d2
8	Respiratory system	1	2	a2,b1,b2,c1,d1
9	Reproductive system	1	2	a2,b1,b2,c1,d1
10	Urinary system	1	2	a1,a2,,b2,c1,d1,d2
11	Endocrine system	1	2	a2,b1,b2,c1,d1
12	Final practical exam	1	2	a1,a2,,b1,b2,c1,c2,d1,d2
Number of Weeks /and Units Per Semest5er 15			30	

VI. Teaching strategies of the course:

- Lectures
- Audiovisual & lab sessions
- Group work/ pair work
- Role play activities
- Enabled group discussion
- Brain storming
- Collaborative teaching techniques (with mixed and same ability groups)
- Critical questioning
- Tapping into prior knowledge
- Think pair share
- Reinforcements- homework
- Hand-outs, worksheets
- Power-point presentations/ reviews
- Presentations
- Group presentations
- Role play
- Participations
- Group discussions
- Question and answer session related to selected topics

Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Assignment 2 micro report about of Musculoskeletal	a2,b2,c1,c2,d1,d2	2	1.25%
2	Assignment 2 micro report about of nervous system	a2,b2,c1,c2	4	1.25%
3	Assignment 3 micro-report CVS	a1,b1,c1,d2	7	1.25%
4	Assignment 3 micro-report Urogenital	a1,b2,c1,c2,d1	11	1.25%

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	Quizzes, oral & discussion notes	WEEKLY	10	10%	a1,a2,b1,b2,c1,c2,d1,
2	Assignments & Homework, Tasks & Presentation	2,4,7,11	5	5%	a1,a2,b1,b2,c1,d1,
3	Mid-Term exam	8	10	10%	a1,a2, b1 ,c1,c2,d1,d2
4	Final exam practical	14	15	15%	a1,a2,c1,d1

5	Final Exam theory	15	60	60%	a1,a2, b1 ,c1,c2,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- Human Anatomy by Marieb, Wilhelm, Mallatt, 9th edition. Pearson.
- 2- Chummy S. Sinnatamby , 2011:Last's Anatomy: Regional and Applied (MRCS Study Guides) 12th Edition Churchill Livingstone.

2- Essential References.

- 1- Richard Drake ,2020: Gray's Atlas of Anatomy (Gray's Anatomy) 3rd Edition, Churchill Livingstone
- 2- Harold Ellis, Vishy Mahadevan , 2018: Clinical Anatomy: Applied Anatomy for Students and Junior Doctors 14th Edition Wiley-Blackwe
- 3- Alan J. Detton ,2016: Grant's Dissector Sixteenth, North American Edition, LWW
- 4- Frank H. Netter, 2018: Atlas of Human Anatomy (Netter Basic Science) 7th Edition Elsevier
- 5- Anne M. R. Agur ,2019: Moore's Essential Clinical Anatomy 6th Edition, LWW;
- 6- LAWRENCE E. WINESKI ,2018: Snell's Clinical Anatomy by Regions 10th Edition LW
- 7- Rachel Koshi ,2017: Cunningham's Manual of Practical Anatomy VOL 2 Thorax and Abdomen (Oxford Medical Publications) 16th Edition Oxford University Press

3- Electronic Materials and Web Sites *etc.*

- <http://free-books.us.to>
<http://ebookfi.org>
<http://libgen.info>
<http://bookos.org/>
www.wikipedia.org/wiki/
 Journal of anatomy, American journal of anatomy, anatomical record and clinical anatomy

IIX. Course Policies:

1	<p>Class Attendance: -</p> <p>Students must attend all the consultation sessions in class and constantly show individual progression until the week of deadline. 80% attendance is the basic requirement of this course. Students failing to meet this requirement will face a penalty of mark percentage deduction. Any progression checks after due dates will not be accepted, unless you have valid reasons with supportive documents.</p>
2	<p>Tardy: -</p> <ul style="list-style-type: none"> • The student will be regarded as absent if he or she is 10 minutes late in attending to the class.

	<ul style="list-style-type: none"> Absence from lectures and / or practical sessions shall not exceed 25%. Students who exceed this percentage limit without a medical or emergency excuse acceptable to and approved by the dean of the college shall not be allowed to enter the final examination.
3	<p>Exam Attendance/Punctuality: - All examination and their roles will be according to students affairs regulations.</p>
4	<p>Assignments & Projects: - Assignments MUST be submitted on the due date handed personally to your module lecturer. Assignments can be submitted before the due date outside of class with the prior agreement of the lecturer. Late Assignments / Extensions Work that is submitted after the due date will be PENALIZED. 2 marks will be deducted every subsequent day after failure to submit on the deadline set by the lecturers. Deduction applies on weekdays and Saturday. No work will be accepted after one week of delay from the deadline given, unless you have valid reasons with supportive documents. Extensions can only be granted if a student can show adequate progress towards completion of the assessment and there are extenuating circumstances preventing them from delivering the assessment on the due date. In the case of a request of an extension due to medical circumstances, students must produce an original medical certificate. The lecturer will only give extensions for a total amount of time not exceeding the equivalent number of days the medical certificate considered valid.</p>
5	<p>Cheating: - students who have been caught in any cheating case will be punished according to the students-affairs regulations.</p>
6	<p>Plagiarism: Plagiarism is a breach of intellectual property; the act of using or copying someone else's idea or work and trying to present it as your own. It is taking and using someone else's work without proper attribution. Intellectual Property involves:</p> <ul style="list-style-type: none"> • Another person's idea, opinion, or theory • Any facts, statistics, graphs, drawings—any pieces of information—that are not common knowledge • Quotations of another person's actual spoken or written words • Paraphrase of another person's spoken or written words <p>Issues of intellectual property extend beyond the written word of course. Bear in mind that the use of still images, moving images, audio or any other content which you have not created yourself, and which you do not have the appropriate permission to use, is an serious offence resulting in a FAIL grade for the subject</p>
7	<p>Other policies: -</p> <ul style="list-style-type: none"> Using Internet Sources The World Wide Web has become a popular source of information for students' papers,

and many questions have arisen about how to avoid plagiarizing these sources. In most cases, the same rules apply as for a printed source: when you refer to ideas or quote from a WWW site, you must cite that source. If you want to use visual information from a WWW site, many of the same rules apply. Copying visual information or graphics from a WWW site (or from a printed source) into a paper is very similar to quoting information, and the source of the visual information or graphic must be cited. These rules also apply to other uses of textual or visual information from WWW sites.

- All the regulations and rules of study system in the university should be followed by students.

Course Specification

I. Course Identification and General Information:					
1	Course Title:	Physiology I			
2	Course Code & Number:	B1101221			
3	Credit hours:	C.H			TOTAL
		Th	Seminar	Pr	
		2		2	
4	Study level/ semester at which this course is offered:	Level 2, semester 1			
5	Pre –requisite (if any):				
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:	Thamar university, faculty of Medical Sciences			
11	Prepared By:	Dr. Adel Ali AMRAN			
12	Date of Approval				

II. Course Description:

The course is designed to provide the students with knowledge about the normal functions

and mechanism of various physiological systems basis on the anatomical and histological

correlation, including: blood cells and blood clotting, nerves and muscles,
Contractions of skeletal muscles, excitation contraction coupling. Neuromuscular
Transmission.

III. Course Objectives:

The course is designed for pharma D students and it introduces them to the science of physiology by defining the concept of physiology and the term homeostasis and its importance to the human body to achieve normal function

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. Describe the cellular functions at the organelle and molecular level	
a2. Introduce the concept of internal environment and homeostasis.	
a3. Describe the principles and mechanisms of blood formations	
a4. Describe the fundamental of the nervous system and muscle system	

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. Interpret the most important physiological laboratory results (blood ,neuromuscular), to	

distinguish a physiological from a pathological condition.	
b2. Integrate physiology with other basic and clinical sciences	

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. support the theory and help students to comprehend the general physiologic principles of the performance of the human body	
c2. Performing hematological tests	
c3. Present physiological scientific data in a graphical form	c1

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. Work individually or in a team to research and prepare a scientific topic	
d2. Use available presentation aids (e.g Overhead Projectors or Data Show) to present clearly and effectively a scientific topic in a seminar, or the yearly scientific day.	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
a1. Describe the cellular functions at the organelle and molecular level	- Interactive lectures. - Video.	- Quiz - Attendance
a2. Introduce the concept of internal environment and homeostasis.	- Interactive lectures. - Video. - Seminars.	- Quiz - Attendance - Seminars
a3. Describe the principles and mechanisms of blood formations	- Interactive lectures. - Video.	- Quiz - Attendance - Seminars
a4. Describe the fundamental of the nervous system and muscle system	- Seminar	

(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 most important physiological laboratory results (blood ,neuromuscular), to distinguish a physiological from a pathological condition.	- Practical training in the lab. -	- Quiz - Attendance - Practical exam - Reports
b2. Integrate physiology with other basic and clinical sciences		

(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. support the theory and help students to comprehend the general physiologic principles of the performance of the human body	- Practical training in the lab. -	- Quiz - Attendance - Practical exam - Reports
c2. Calculate erythrocytes sedimentation rate and hemoglobin count		
c3. Present physiological scientific data in a graphical form		
(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 individually or in a team to research and prepare a scientific topic	-	
d2. Use available presentation aids (e.g Overhead Projectors or Data Show) to present clearly and effectively a scientific topic in a seminar, or the yearly scientific day.		

V. Course Content:					
A – Theoretical Aspect:					
Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Introduction to	- role of physiology in	1	2	a1

	human physiology	<ul style="list-style-type: none"> - clinical medicine, - Physiology definition, differentiation of body systems functions - How Is the Body Organized - General Principles of Physiology 			
2	Homeostasis and body fluids	<ul style="list-style-type: none"> - General Characteristics of Homeostatic Control Systems - Processes Related to Homeostasis - Definition, mechanisms and The extracellular fluid and the internal environment - Body water regulation - Osmolarity and tuncicity 	1	2	a2,a3
3	Blood	<ul style="list-style-type: none"> - Blood & Circulation: Functions of the circulatory system; Major components of the circulatory system; Composition of the blood; plasma; Formed elements of blood; - Hematopoiesis; Regulation of Erythropoiesis; - White blood cells types and Functions - Red blood cell antigens and blood typing; ABO system; Transfusion reaction; Rh Factor; Blood clotting; factors : formation of fibrin; Dissolution of clots; Anticoagulants. - Hemolytic Diseases. Bleeding disorders. - Capillary Exchange. Acid-Base Balance of the Blood 	5	10	a1,a2,a3 b1 c1,c2

4	Cell	<ul style="list-style-type: none"> - Physical structure of the cell and Functional system of the cell - Protein Synthesis, - Diffusion and transport across cell membrane - Body fluid, osmosis - osmolality, tonicity, water balance & edema 	2	4	a1,a2
5	Neuronal Signaling and the Structure of the Nervous System	<ul style="list-style-type: none"> - THE NERVOUS SYSTEM (NEURONS & SYNAPSES): Neuron, structure & functions & supporting cells; Electrical activity in axons; Action potentials; All or none law; - Refractory Periods; Conduction Of nerve impulses in myelinated and un myelinated axons -Synapse; Electrical & chemical Synapses - Action of neurotransmitter; types -Receptors 	3	6	a1,a2,
6	Muscle	<ul style="list-style-type: none"> - Muscle types - Skeletal muscle filaments and associated proteins - Contraction cycle, Sliding filament hypothesis Ratchet theory of muscle contraction - The Neuromuscular Junction. 	2	4	a1,a2
8	Med exam and Final exam		2	4	
Number of Weeks /and Units Per Semester 16				34	

B – Case Studies and Practical Aspect: (if any)				
Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Laboratory safety	1	2hr/ group	b1 c1,c2,c3 d1,d2
2	Microscopic component	1	2hr/ group	
3	Blood sample	2	4hr / group	
4	Hb,PCV	1	2hr/group	
5	Blood groups	1	2hr/ group	
6	RBC,WBC	1	2hr/ group	
7	ESR	1	2hr/group	
8	Give intramuscular, subcutaneous, intradermal and intravenous Injections	1	2hr/ group	
9	Nerve cell stimulation	1	2hr/ group	
10	Metabolism calculating calories	1	2hr/group	
11	Muscles tons	1	2hr/ group	
12	Blood film	2	2hr/ group	
13	Med exam	1	2hr/ group	
14	Final exam	1	2hr/ group	
Number of Weeks /and Units Per Semester		16	32	

VI. Teaching strategies of the course:

1. Interactive lectures.
2. Video.
3. Seminars.
4. Practical training in the lab.

Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Seminar			

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	Continuou	5	5%	a1- a4

		s			
2	Attendance	Continuou s	5	5%	
3	Written Med-year Test	6	10	10%	a1- a4
4	Practical Med-year exam & Lab. Reports	7	5	5%	c1- c3
5	Practical Final exam	13	15	15%	c1- c3
	Final Exam (Oral & Written)	16	60	60%	a1-a4 b1-b2
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- 1-K Sembulingam & Prema Sembulingam (2012) .6th ed. Essentials of Medical Physio
Jaypee Brothers Medical Publishers
- 2- Guyton AC & Hall JE (2011) Textbook of Medical Physiology. 12th ed. Philadelphia:
Saunders
- 2- William F. Ganong (2009) Review of medical physiology. Twenty fourth edition..Mc
Graw Hill. LIBRAIRE DU LIBAN

2- Essential References.

- 1- VANDER'S HUMAN PHYSIOLOGY: THE MECHANISMS OF BODY FUNCTION.
13th ed. McGraw-Hill. United States of America
- 2- Lectures notes

3- Electronic Materials and Web Sites *etc.*

- 1- online tutori2- <http://www.bpcc.edu/sciencealliedhealth/humanphysiologylinks.html>
- 1- MasteringA&P (www.masteringaandp.com)

2- www.learnsmartadvantagedemo.com

Course Specification Organic chemistry I

I. Course Identification and General Information:					
1	Course Title:	Organic chemistry I			
2	Course Code &Number:	B1101234			
3	Credit hours:	C.H			TOTAL
		Th.	Seminar	Pr	
		2		1	
4	Study level/ semester at which this course is offered:	Second year –first semester			
5	Pre –requisite (if any):	B1101132			
6	Co –requisite (if any):	Non			
7	Program (s) in which the course is offered:	PHARMA .D ,			
8	Language of teaching the course:	ENGLISH			
9	Location of teaching the course:	COLLEGE OF MEDICAL SCIENCES .THAMAR UNIVERSITY			
10	Prepared By:	PROF. DR DAIEKH ABED ALI ABOD			
11	Date of Approval				

II. Course Description:

The aim of the course is to provide students with proper understanding of the basic principles of organic reactions. In addition, providing a good idea about the stereochemistry of the chiral organic compounds. The students will be capable to identify certain aliphatic organic compounds and recognize their chemical properties, synthesis and reactions.

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)

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,A3	a1- Define the three-dimensional structure of organic molecules and explain their stereochemical relationship.
	a2- Describe organic molecules basic reactions and the corresponding reaction mechanisms and apply this on drug molecules.

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, B3	b1- Develop and enhance self-direction, problem solving skills, innovation, critical thinking, and leadership potential
	b2- Interpret rational chemical names and name simple pharmacological organic molecule.

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, C2	c1- Plan and carry out syntheses of simple pharmaceutical substances, as well as orally and in writing account for the theoretical and practical results.
	c2- Use the perfect tools and instruments to conduct laboratory tests in organic chemistry lab.

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 , D2	d1- Communicate effectively with others in one-to-one, small groups and large group, orally and in written form
	d2- Use the internet tools and statistical/mathematical skills to cope with the courses demands.

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- Define the three-dimensional structure of organic molecules and explain their stereochemical relationship.	lectures seminars dialog and discussion home work self-education cooperative education	Evaluation home works Written exams Oral exams
a2- Describe organic molecules basic reactions and the corresponding reaction mechanisms and apply this on drug molecules.		
(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Develop and enhance self-direction, problem solving skills, innovation, critical thinking, and leadership potential	Tutorial, problems solving, electronic learning, dialog and discussion home work self-education cooperative education	Evaluation home works Written exams Oral exams Assignment
b2- Interpret rational chemical names and name simple pharmacological organic molecule.	-	

(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- Plan and carry out syntheses of simple pharmaceutical substances, as well as orally and in writing account for the theoretical and practical results	Laboratory session, practical demonstration, electronic learning, group discussion, laboratory working	Lab report, practical exam, lab performance.
c2- Use the perfect tools and instruments to conduct laboratory tests in organic chemistry lab		
(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Communicate effectively with others in one-to-one, small groups and large group, orally and in written form	Tutorial, presentation, lab session, assignment, electronic learning.	Oral exam, assignment report, presentation
d2- Use the internet tools and statistical/mathematical skills to cope with the courses demands.		

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Introduction.	-bonding in organic molecules. -covalent bondings and formal charges. -polar covalent bond. -structure of molecule -polar and non polar molecules. - resonance structures -atomic and molecular orbital. -valence bond theory and resonance. -hybridization.	1	2	a1,b2
2	Alkanes	Structure, properties, and nomenclature Synthesis and chemical reactions Conformational analysis and structural isomerism's	1	2	a2,b1
3	Alkenes and alkynes	Structure and nomenclature Synthesis and reactions Acidity of alkyne	1	2	a1,a2,b2
4	Cycloaliphatic hydrocarbons	Cycloaliphatic hydrocarbons Structure and the strain theory Stability and their reactions Conformational analysis	1	2	a2,b1d1
5	Dienes	Dienes : conjugation and resonance Stability and reactivity	1	2	a1,a2,b1,d1,d2

		Electrophilic addition reactions (1,2- vs 1,4- addition) Isoprene reactions			
	Organic reactions	Organic reactions: Substitution (free radical, nucleophilic, substitution reactions) Elimination reactions Addition reactions. Rearrangement reaction	1	2	a1,a2,b1,d1,d2
7	Midterm exam		1	2	a1,a2,b1,d1,d2
8	Alkyl halides	Alkyl halides: Classification and their physical properties. Preparation of aliphatic halides. Nucleophilic aliphatic substitution Mechanism and kinetics of both(SN1 and SN2) Carbocations structure and stability Organometalic compounds. Dehydrohalogenation of alkyl halides Elimination reactions (E1 and E2) mechanisms Elimination E1 vs E2	2	4	a1,a2,b1,d1,d2
9	Functional groups	Functional groups and the systematic nomenclature of organic compounds (IUPAC nomenclature)	1	2	a1,a2,b1,d1,d2
10	Stereochemistry and stereoisomerism	Stereochemistry and stereoisomerism: Optical activity, chiral center and enantiomers Diastromers , Meso structures and the reactions of chiral molecules. Racemic reactions	1	2	a1,a2,b1,d1,d2
11	Alcohols and ethers	Alcohols and ethers, thioethers. Classification and properties of Alcohol Structure and nomenclature Preparation and Reactions of	2	4	a1,a2,b1,d1,d2

		alcohols (alcohols as acids and bases, oxidation and analysis of diols) . Ethers, thioethers and thiol			
12	Aldehydes and ketones	Aldehydes and ketones. Nomenclature. Preparation. General consideration of the reactions Unsaturated aldehydes and ketones	1	2	a1,a2,b1,d1,d2
13	Characterisations of molecules	Characterisations of molecules using spectroscopic techniques (IR, MS and NMR)	1	2	a1,a2,b1,d1,d2
14	Final exam		1	2	a1, a2,b1,d1,d2
Number of Weeks /and Units Per Semester			16	32	

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

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc.	2	4	c1,c2,b1,d1
	test for purity, assay and medicinal uses of Chlorbutol, Dimercaprol, Glyceryl trinitrate, Urea, Ethylene diamine dihydrate, Vanillin, Paraldehyde, Ethylene chloride, Lactic acid, Tartaric acid, citric acid, salicylic acid, aspirin,	2	4	c1,c2,b1
2	functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides.	2	4	c1,c2,b1,d1

	Midterm exam	1	2	c1,c2,b1,d1
3	Melting point/Boiling point of organic compounds, Identification of the unknown compound from the literature using melting point/ boiling poi	2	4	c1,c2,b1,d1
4	Preparation of the derivatives and confirmation of the unknown compound by melting point/ boiling point. Minimum 5 unknown organic compounds to be analysed systematically.	2	4	c1,c2,b1,d1
	Systematic qualitative organic analysis including preparation of derivatives Phenols, amides, carbohydrates, amines, carboxylic acids, aldehyde and ketones, Alcohols, esters, hydrocarbons, anilides, nitrocompound	3	6	
	Final exam	1	2	c1,c2,b1,d1
Number of Weeks /and Units Per Semester 15 week			30	

VI. Teaching strategies of the course:

Group discussion, Brain storming, Reinforcements- homework, Hand-outs, worksheets, Power-point presentations/ Group presentation , Laboratory practices , electronic learning

VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Assignments & Homework, Tasks & Presentation	d1,d2,b1	3, 12	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	Quizzes	6, 12	5	5%	a1,a2,b1,d1
2	Assignments & Homework, Tasks & Presentation	3, 12	5	5%	d1,d2,b1
3	Mid-Term exam	8	20	20%	a1,a2,b1,d1
4	Practical reports/exam	7	10	10%	c1,c2,b1,d1
5	Final exam practical	15	20	20%	c1,c2,b1,d1
6	Final Exam theory	16	40	40%	a1,a2,b1,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- Robert Thornton Morrison , Robert Neilson Boyed and Saibal Kanti Bhattacharjee,2013, ORGANIC CHEMISTRY ,INDIA , PEARSON
 - 2- T. W. Graham Solomons et al. Organic Chemistry, A. Snyder 11th Ed., 2014.
 - 3- Donald L. Pavia et al, Microscale Approach to Organic Laboratory Techniques. Engel, 4th Ed., 2016
 - 4- Eliel, E.L., 2005. Stereochemistry of Carbon Compounds. Tata McGraw-Hill, New Delhi, India.
- Organic Chemistry, T.W. Graham Solomons; Cralg B. Fryhle, 10 th ed., John Wily and Sons (2011).

2- Essential References.	
	William L. Masterton, Cecile N. Hurley, Edward Neth, Chemistry: Principles and Reaction 7th Edition 2012: ISBN-10: 1111427100
3- Electronic Materials and Web Sites etc.	
	Electronic Materials and Web sites http://chemed.chem.purdue.edu/genchem/topicreview/index.php http://www.whfreeman.com/vollhardtschore5e http://en.wikipedia.org/wiki/Organic_chemistry

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	<p>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</p> <p>-</p>
6	<p>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</p>
7	<p>Other policies: Using mobile or another electronic device capable to store or transfer data in class during the lecture or the exam is forbidden.</p> <p>-</p>

Course Specification Histology

I. Course Identification and General Information:					
1	Course Title:	Histology			
2	Course Code & Number:	B1102225			
3	Credit hours:	C.H			TOTAL
		Th.	Seminar	Pr	
		2		1	
4	Study level/ semester at which this course is offered:	2 nd Year 1 st semester			
5	Pre –requisite (if any):	General Biology			
6	Co –requisite (if any):				
7	Program (s) in which the course is offered:	Pharm D			
8	Language of teaching the course:	English			
9	Location of teaching the course:				
10	Prepared By:	Dr. Abdulrahman Al-Haifi			
11	Date of Approval	2021			

II. Course Description:

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III. Course Objectives:

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IV. Course Intended Learning Outcomes (CILOs):

Knowledge and Understanding:

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

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

Knowledge and Understanding PILOs	Knowledge and Understanding CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
A1	a1. Describe normal histological structure of various systems previously mentioned Respiratory , digestive , endocrine , urinary , male & female genital , eye & ear
	a2. Describe various levels of sections in the spinal cord & brain stem
	a3. Describe various pathways of descending pyramidal, extrapyramidal tracts and pathways of ascending sensory tracts
	a4. Describe various types of lemnisci, medial longitudinal bundle, both cerebrum and cerebellum with its various connections

Intellectual Skills :

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

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

Intellectual Skills PILOs	Intellectual Skills CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
B1	b1. Know various types of special stains for various organs
	b2. Know ultrastructure of different cells studied in various organs
	b3 Know how to label diagrams of different levels in the spinal cord & brain stem

Professional and Practical Skills

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

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

Professional and Practical Skills PILOs	Professional and Practical Skills CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
C1	c1. Answer questions on various parts of the curriculum
	c2. Correlate between histological structure & function of different organs of all systems
	c3. Diagnose slides different from those seen during his course but of the same organs previously studied

Transferable (General) Skills :

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

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

Transferable (General) Skills PILOs	Transferable (General) Skills CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
D1	d1. Communicate with teacher, ask questions, solve problems, and use computers

VI. Alignment Course Intended Learning Outcomes

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Describe normal histological structure of various systems previously mentioned Respiratory	- Lectures and	- Quizzes,

, digestive , endocrine , urinary , male & female genital , eye & ear	<p>Groups discussion.</p> <ul style="list-style-type: none"> - Practical presentations - Self - learning 	Written exam.
a2. Describe various levels of sections in the spinal cord & brain stem		
a3. Describe various pathways of descending pyramidal, extrapyramidal tracts and pathways of ascending sensory tracts		
a4. Describe various types of lemnisci, medial longitudinal bundle, both cerebrum and cerebellum with its various connections		

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Know various types of special stains for various organs	<ul style="list-style-type: none"> - Discussions and Training - Field visits - Problem solving 	<ul style="list-style-type: none"> - Quizzes, Homework - Observation - Task's Evaluates
b2. Know ultrastructure of different cells studied in various organs		
b3. Know how to label diagrams of different levels in the spinal cord & brain stem		

(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. Answer questions on various parts of the curriculum	<ul style="list-style-type: none"> - Discussions and Training - Field visits - Problem solving 	<ul style="list-style-type: none"> - Quizzes, Homework - Observation - Task's Evaluates
c2. Correlate between histological structure & function of different organs of all systems		
c3. Diagnose slides different from those seen during his course but of the same organs previously studied		

(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 with teacher, ask questions, solve problems, and use computers	<ul style="list-style-type: none"> - Group discussions - Cooperative learning. 	<ul style="list-style-type: none"> - Homework - Evaluates of

	- Self – learning - Inductive and deductive	Oral Presentation
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VII. Course Content:.

A. Theoretical Aspect:

Order	Topic List	Sub Topics List	No of Week	contact hours	ILOS
1	Basic histology	<ul style="list-style-type: none"> The epithelial tissue. Characteristic Features of Epithelial Cells. Specializations of the Apical Cell Surface. Types of Epithelia Transport across Epithelia. Renewal of Epithelial Cells. 	3	6	a1,-a3, b1-b3,
2	The connective tissue	<ul style="list-style-type: none"> Cells of Connective Tissue. Fibers Ground Substance. Types of Connective Tissue. Adipose Tissue. Cartilage. Bone. 	3	4	a1, a2, a4, b1,b2
3	The muscular tissues	<ul style="list-style-type: none"> Smooth muscles. Skeletal muscles. Cardiac muscles. 	2	4	a1, a2, a6, b1, b3
5	The nervous tissues.	The nervous tissues.	1	2	a3, b1-b3
6	The blood	The blood	1	2	a1, a2, a4, b1-b3
7	Systemic histology:	1-The aorta, 2- spleen and lymph nodes, 3- trachea and lung. 4- Liver and pancreas 5- stomach fundus and small intestine 6- kidney,	4	8	a1, a2, b1,

		7- testis, 8-ovary, 9-pituitary gland and thyroid gland, 10- spinal cord.			b2, d1
Number of Weeks /and Units Per Semester			14	28	

B. Practical Aspect:				
Order	Topics List (Tasks/ Experiments)	No of Weeks	Contact Hours	ILOS
1	Introduction: Micro and macro anatomical cytological and histochemical sample.	1	2	c1-c3
2	Macroscopically examination.	1	2	c1
3	Decalcification: <ul style="list-style-type: none"> • Definition, techniques. • Decalcification solution. 	1	2	c1-c3
4	Tissue processing: <ul style="list-style-type: none"> • Manual methods: • Fixation. • Dehydration. • Clearing. • Impregnation. • Automatic methods. 	2	4	c1-3
5	Embedding, blocking out, and trimming.	1	2	c1-c3
6	Section cutting and microtome	1	2	c1, c2
7	Staining	2	4	c1, c2
8	Mounting	1	2	c2, c3
9	Cytological techniques.	2	4	c1-c3
Number of Weeks /and Units Per Semester		12	24	

VIII. Teaching strategies of the course:

- Lectures
- Groups discussion.
- Discussions and Training
- Practical presentations
- Problem solving
- Practical in Lab
- Self – learning
- Inductive and deductive

IX. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Class attendance and participation	a1, a2,a3, a4, b1, b2, b3, c1, d1	weekly	2.5
2	Homework, presentation	a1, a2, b1, b2, c1, d1.	11	2.5

X. 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-a4, b1,c1
3	Mid-semester exam of theoretical part (written exam	8	10	10%	a1,a2,b1,c1, d1
	Quizzes 2	12	2.5	2.5%	a2, b1, b2, c1, d1
4	Lab. Term Attitude	1-11	5	5%	c1-c3, d1,d2

5	works	Accomplishments		5	5%	
6	Final exam (practical)		12	20	20%	c1-c3,d1,
7	Final exam of theoretical part (written exam)		16	50	f0%	a1-a4,b-,b3,c1, d1
Total				100	100%	

XI. Learning Resources:

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

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

1. Gartner, L.P. and Hiatt, J.L. Color Text Books of Histology: Saunders Co., Baltimore, Latest Edition.
2. Wheater's Functional Histology. Churchill Livingstone, Latest Edition.

2- Essential References.

3- Electronic Materials and Web Sites etc.

Course Specification of Physical Pharmacy

I. Course Identification and General Information:					
1	Course Title:	Physical Pharmacy			
2	Course Code & Number:	PH1122122			
3	Credit hours:	C.H			TOTAL
		Th.	Seminar	Pr.	
		2		2	
4	Study level/ semester at which this course is offered:	2nd level/ 1st semester			
5	Pre –requisite (if any):	Medical Physics			
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 deals with study of the various physical phenomena applied or observed in pharmacy in particular pharmaceutical dosage forms design and formulation. Therefore, this course can be referred so as to introduction to "pharmaceutics" courses.

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 Show sound understanding of physical properties and phenomena that influence the design of pharmaceutical preparations

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

a1 Show sound understanding of physical properties and phenomena that influence the design of pharmaceutical preparations

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 Apply relevant equations to calculate physical measurements related to formulation and stability of pharmaceutical preparations

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 Apply relevant equations to calculate physical measurements related to formulation and stability of pharmaceutical preparations

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 measure physical properties successfully in the laboratory.

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 measure physical properties successfully in the laboratory.

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 and in teacher in the lab
- d2 Participate efficiently with his colleagues in a team work
- d3 Demonstrate the skills of time management and self-learning

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 and in teacher in the lab
D3	Work effectively individually and in a team	d2	Participate efficiently with his colleagues in a team work
D4	Have the skills of decision-making and time management and lifelong learning	d3	Demonstrate the skills of time management and self-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 Show sound understanding of physical properties and phenomena that influence the design of pharmaceutical preparations	<ul style="list-style-type: none"> - Lectures and presentation. - Self – learning 	<ul style="list-style-type: none"> - 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	Apply relevant equations to calculate physical measurements related to formulation and stability of pharmaceutical preparations	<ul style="list-style-type: none"> - Lectures, Discussions - Brain Storming 	<ul style="list-style-type: none"> - Achievement tests (Written Tests) - Oral Tests

(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:			
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies	
c1	Handle efficiently and safely the chemical materials and tools used in the laboratory.	<ul style="list-style-type: none"> - Lectures, presentation - Practical training 	<ul style="list-style-type: none"> - Lab Reports' Evaluation - Practical exam
c2	Operate the instruments and measure physical properties successfully in the laboratory.	<ul style="list-style-type: none"> - Cooperative & Self-learning 	

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:			
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies	
d1	Communicate effectively and behave in discipline with colleagues and in teacher in the lab.	<ul style="list-style-type: none"> - Group discussions - Self – learning - Cooperative learning 	<ul style="list-style-type: none"> - Homework Evaluation. - Oral Presentation & discussion
d2	Demonstrate the skills of time management and self-learning.		
d3	Participate efficiently with his 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	Introduction to physical pharmacy	<ul style="list-style-type: none"> - Scope and purposes of physical pharmacy - State of matters : factors affecting (intermolecular forces, vapor pressure, atmospheric pressure, thermal energy) - Circle of inter-conversion of a matter from a state of state ; name of processes, internal and external factors 	1	2	a1
2	Physical properties of solid state	<ul style="list-style-type: none"> - Melting point - Micrometrics <ul style="list-style-type: none"> o Particle size, particle shape o Arrangement of particles: Crystals, amorphous, polymorphism, solvate (hydrates) o Crystallization : principles and applications o Tapped and bulk density and porosity o Flowability : Carr`s index & angle of repose - Surface Energy & wettability. 	3	6	a1, b1
3	liquid states physical properties	<ul style="list-style-type: none"> - Thermodynamic liquids: Evaporation, boiling, vaporization and volatilization - Vapour pressure - Viscosity - Rheology(Newtonian and none Newtonian flow ...ect. Thixotropy,.. - Surface phenomena: Surface tension, interfacial tension 	3	6	a1, b1
4	Physical interactions between matters	<ul style="list-style-type: none"> - Bulk Interactions <ul style="list-style-type: none"> o Dissolution; solubility , miscibility; o Dispersion , Solubilization, & Critical micelles concentration; types and roles of surfactants; factors reducing surfactant activity , HLB 	4	8	a1, b1

		<ul style="list-style-type: none"> ○ Partition coefficient : Hydrophilicity and lipophilicity and role of pH - Surface interactions <ul style="list-style-type: none"> ○ Adsorption ○ Complexation - Transfer of matter: Diffusion - Incompatibility 			
5	Stability and Degradation	<ul style="list-style-type: none"> - Concept of stability <ul style="list-style-type: none"> ○ Definition and types of degradation ○ Definition and types of stability ○ Causes of degradation ○ Stabilizers and other approaches to reduce degradation - Kinetics of stability <ul style="list-style-type: none"> ○ Order of degradation (zero, first, second) : equations, rate constants, half-life ○ Stability determination: accelerated, long-term, shelf life (t_{90}) 	3	6	a1, b1
Number of Weeks /and Units Per Semester			14	28	

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Intended Learning Outcomes CILOs
1.	Melting point determination by capillary method	1	2	c1, c2, d1, d2
2.	Particle size analysis (sieve and sedimentation method)	2	4	c1, c2, d1, d2
3.	Crystallization : preparation of salicylic acid crystals	1	2	c1, c2, d1, d2
4.	Tapped and bulk density porosity and Carr`s index of flowability description	1	2	c1, c2, d1, d2, d3
5.	Viscosity determination (Ostwald tube)	1	2	c1, c2, d1, d2, d3

6.	Surface tension determination (Capillary or Drop weight method)	1	2	c1, c2, d1, d2, d3
7.	Critical micelles concentration (CMC)determination	2	4	c1, c2, d1, d2, d3
8.	Partition coefficient determination (salicylic acid between water & ether)	2	4	c1, c2, d1, d2, d3
9.	Revision	1	2	c1, c2, d1, d2, d3
Total		12	24	

VI. Teaching strategies of the course:

- Lectures and presentation.
- Discussions
- Brain Storming
- Problem solving
- Self – learning
- Group discussions
- Cooperative learning

VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Class attendance and participation	a1, b1, c1, d1, d3	weekly	2.5
2	Exercises and home work	a1, b1, c1, c2, d1, d2	14	2.5
Total Score				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	1-14	5	5%	a1,b1,c1,

					c2, d1,d2,d3
2	Quizzes 1	6	2.5	2.5%	a1, b1
3	Mid-semester exam of theoretical part (written exam	8	10	10%	a1, b1
	Quizzes 2	12	2.5	2.5%	a1, b1, d1, d2
4	Lab. Term	1-12	5	5%	c1, c2,d1,d2,d3
5	works		5	5%	
6	Final exam (practical)	12	20	20%	c1, c2,d1,d2,d3
7	Final exam of theoretical part (written exam)	17	50	50%	a1,b1, d1,d2,d3
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. Martin`s : Physical pharmacy and pharmaceutical sciences, 2011, Lippincott Williams & Wilkins, UK
2. Aulton M.E., Pharmaceutics: the science of dosage form design, 2002, Churchill Livingstone, UK

2- Essential References.

1. Subrahmanyam. A text book of physical pharmaceutics, 2015, Vallabh Prakashan, India
2. R.S. Gaud G.T. Gupta practical physical pharmacy, 2012, CBS, USA
3. Patrick J. Sinko (2006). Martin's Physical Pharmacy and Pharmaceutical Sciences.

3- Electronic Materials and Web Sites etc.

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Course Specification of **Pharmacognosy**

I. Course Identification and General Information:					
١	Course Title:	Pharmacognosy			
٢	Course Code & Number:	B1101271			
٣	Credit hours:	C.H			TOTAL
		Th.	Seminar	Pr	
		2		1	
٤	Study level/ semester at which this course is offered:	<i>Level 2/ semester 1</i>			
٥	Pre –requisite (if any):				
٦	Co –requisite (if any):				
٨	Program (s) in which the course is offered:	Bachelor of Pharmacy Doctor (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. Ahmed G. Al- Akydy – Dr. Ahmed Al-Washli			
12	Date of Approval	2021			

II. Course Description:

This course provides the student with an overview of the concept of pharmacognosy. Topics include the knowledge related to drugs of plant sources from different organs such as seeds, leaves, fruits, subterranean organs and unorganized drugs, which are reputed to be used in folk medicine and have curative values or use in the pharmaceutical industry. The students should be familiar with the morphological and histological characters of the studied plant organs, their detection, identification either entire or in powdered form, their active constituents and uses and any health risks concerning their misuse and abuse and interactions if there is any.

III. Course Objectives:

1. To know the basic principles and concepts of pharmacognosy.
2. To identify many medicinal plants macro- and microscopically in both their entire and powdered forms.
3. To familiarize with the qualitative and quantitative analysis used in pharmacognosy
4. To understand the role of natural products in research and development of drugs, as well as, in the treatment and prevention of disease.

I. 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 morphologically and under the microscope of the different organs of plants.
- a2, List the different active ingredients and their chemical classes for the studied crude drugs and how to test for them chemically.
- a3. Understand the pharmaceutical importance, in the term of therapeutic uses, adverse effects, and toxicity, adulteration of seeds, flowers, fruits, leaves, bark, woods, subterranean organs, and unorganized 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.	a1	Describe morphologically and under the microscope of the different organs of plants. and under the microscope
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	a2	List the different active ingredients and their chemical classes for the studied crude drugs and how to test for them chemically.
A4	Define basic principles of drug: target identification, design, informatics, and mechanisms of action		
A5	Outline principles of clinical pharmacology, therapeutics and Pharmacovigilance.	a3	Understand the pharmaceutical importance, in the term of therapeutic uses, adverse effects, and toxicity, adulteration of seeds, flowers, fruits, leaves, bark, woods, subterranean organs, and unorganized drugs.

Intellectual Skills :

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

- b1. identify between crude drugs related to seeds, fruits, roots and rhizomes, based on their macroscopical and microscopical characters in the whole state and in the powder condition.
- b2. Select the proper methods for isolation and identification of the active constituents from different organs of plant and evaluate qualitatively and quantitatively of efficacy of this constituents
- b3. Suggest the effective and safe use of natural medicine for individual patient use

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	Identify between crude drugs related to seeds, fruits, roots and rhizomes, based on their macroscopical and microscopical characters in the whole state and in the powder condition.
B2	Design risk reduction strategies to ensure patient safety and prevent medication errors, drug interaction, and adverse drug effects,	b3	Suggest the effective and safe use of natural medicine for individual patient use
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	b2	Select the proper methods for isolation and identification of the active constituents from different organs of plant and evaluate qualitatively and quantitatively of efficacy of this constituents

Professional and Practical Skills

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

- c1. Apply the practical skills of microscopic and chemical tests for identification of different crude drugs and their different active constituents in sections and unknown powdered forms related to seeds, fruits, roots and rhizomes of plants
- C2. Conduct basic qualitative and quantitative analysis for evaluating the efficacy and safety of active ingredients of medicinal compounds in herbal preparations.
- c3. utilize effectively and safely the crude drugs from natural plant sources in the treatment various diseases.

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	c1	Apply the practical skills of microscopic and chemical tests for identification of different

	sources.		crude drugs and their different active constituents in sections and unknown powdered forms related to seeds, fruits, roots and rhizomes of plants
		c2	Conduct basic qualitative and quantitative analysis for evaluating the efficacy and safety of active ingredients of medicinal compounds in herbal preparations.
C4	Carry outpatient physical assessment.		
C5	Advise the patients and health care professionals for optimizing medicines use.	c3	Utilize effectively and safely the crude drugs from natural plant sources in the treatment various diseases.

Transferable (General) Skills :

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

d1 Use different sources to obtain information and knowledge related to medicinal plants and their use
d2 Work effectively either individually or within a team, considering legalizations and ethics of pharmacy profession to perform the required tasks and researches in the field of pharmacognosy.

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,	d1	Use different sources to obtain information and knowledge related to medicinal plants and their
D3	Work effectively individually and in a team	d2	Work effectively either individually or within a team, considering legalizations and ethics of pharmacy profession to perform the required tasks and researches in the field of pharmacognosy.
D4	Have the skills of decision-making and time management and lifelong learning		

IV. 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
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a1	Describe morphologically and under the microscope of the different organs of plants.	<ul style="list-style-type: none"> • Lectures • Discussion Sessions • Assignments 	<ul style="list-style-type: none"> • Periodic exam (Quizzes) • Evaluate assignments • Mid & final exam
a2	List the different active ingredients and their chemical classes for the studied crude drugs and how to test for them chemically.		
a3	Understand the pharmaceutical importance, in the term of therapeutic uses, adverse effects, and toxicity, adulteration of seeds, flowers, fruits, leaves, bark, woods, subterranean organs, and unorganized 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	<ul style="list-style-type: none"> • Discussion Sessions • Problem solving • Group discussion • Assignments 	<ul style="list-style-type: none"> • Oral presentations • Evaluate assignments • Mid & final exam 	
b2			<p>Select the proper methods for isolation and identification of the active constituents from different organs of plant and evaluate qualitatively and quantitatively of efficacy of this constituents</p>
b3			<p>Suggest the effective and safe use of natural medicine for individual patient use</p>

(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	<ul style="list-style-type: none"> • Discussion sessions • Assignments 	<ul style="list-style-type: none"> • Oral presentations • Theory & Practical exams • LAB report

c2	Conduct basic qualitative and quantitative analysis for evaluating the efficacy and safety of active ingredients of medicinal compounds in herbal preparations.		<ul style="list-style-type: none"> Evaluate assignments
c3	Utilize effectively and safely the crude drugs from natural plant sources in the treatment various diseases.		

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:			
Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
d1	Use different sources to obtain information and knowledge related to medicinal plants and the uses	<ul style="list-style-type: none"> Discussion Sessions Assignments that require collecting information from the internet. 	<ul style="list-style-type: none"> Oral presentations Writing
d2	Work effectively either individually or within a team, considering legalizations and ethics of pharmacy profession to perform the required tasks and researches in the field of pharmacognosy		

V. Course Content:					
A – Theoretical Aspect:					
Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Introduction to pharmacognosy	<ul style="list-style-type: none"> Definitions History of treating with herbs Scope of pharmacognosy. Various systems of classification of drugs of natural origin. 	1w	2	a3; b1; d1
2	Ergastic cell contents	<ul style="list-style-type: none"> Cellulose, Hemicellulose, Lignin, Cutin, Suberin, Mucilage, Starch, Protein, Fats, Fixed oils &, Volatile oils Resins, Tannins, Alkaloids, Glycosides Calcium carbonate and calcium oxalate crystals. 	1w	2	a1; b2; c1; d1
3	Cell Differentiation	<ul style="list-style-type: none"> Tissue and tissue systems. <ul style="list-style-type: none"> Dermal tissue system (Epidermis, Stomata, Trichomes 	1w	2	a1; b1; c1; d1

		<p>and Cork).</p> <ul style="list-style-type: none"> ○ Vascular tissue systems (Xylem and phloem [Vessels, Fibers, Tracheids, Sieve tube & companion cells and Secretary glands]) ○ Ground tissue system (Parenchyma, Collenchyma and Sclerenchyma). 			
4	The production of crude drugs	<ul style="list-style-type: none"> - Preparation of crude drugs (collection, cultivation, drying, packing and storing). - Adulteration of drugs and methods for detection 	1w	2	a3; b1; c1; d2
5	The Leaves.	<ul style="list-style-type: none"> - Phyllotaxy and types of leaves. - Macroscopical characters of leaves. - Microscopical characters of leaves. 	1w	2	a1; a2; a3; b1; b2; b3; d1
6	Flowers & inflorescences	<ul style="list-style-type: none"> - Complete pharmacognostical studies of Clove flower bud, Chamomile, Santonica, Pyrethrum & Saffron ...etc. 	1w	2	a1; a2; a3; b1; b2; b3; c1; c3; d1
7	The Seeds	<ul style="list-style-type: none"> - Complete pharmacognostical studies of Nux-vomica, Strophanthus, Linseed, Funegreek, Cocoa, Nutmeg, and Colchicum ...ets. 	1w	2	a1; a2; a3; b1; b2; b3; c1; c3; d1
8	The fruits	<ul style="list-style-type: none"> - Complete pharmacognostical studies of Fennel, Anise, Caraway, Coriander, Ammi visnaga, Ammi majus, Star anise, Capsicum, Vanilla pod, Colcynth, Poppy capsule, Tamarind, Blانيتيس and Nigela sativa.....etc. 	1w	2	a1; a2; a3; b1; b2; b3; c1; c3; d1
9	Subterranean organs (the Roots & Rhizomes)	<ul style="list-style-type: none"> - Complete pharmacognostical studies of Liquorice, Ginger, Rhubarb, Ipecacuanha, Aconite, Rowalfia, Ginseng, Turmeric, Squill, Garlic and Onion.....etc. 	1w	2	a1; a2; a3; b1; b2; b3; c1; c3; d1
10	The barks & woods	<ul style="list-style-type: none"> - Complete pharmacognostical studies of Cinchona, Cinnamon, Cascara, Frangula, Wild cherry, Quillaia, Cassia, Salix, Guaicum & Quassia ...etc. 	1w	2	a1; a2; a3; b1; b2; b3; c1; c3; d1
11	The Herbs.	<ul style="list-style-type: none"> - Complete pharmacognostical studies of Ergot, Ephedra, and Indian Hemp ...etc. 	1w	2	a1; a2; a3; b1; b2; b3; c1; c3; d1

12	Unorganized drugs.	<ul style="list-style-type: none"> - Resins (Asafetida, Myrrh, Ammoniacum, Galbanum - Balsams(Benzoin, Sumatra benzoin, Storax, Balsam tolu, Balsam peru) - Gums. - Dried juice (Aloe). - Dried extract(Agar- Agar, Gelatin). - dried latex (Opium). 	1w	2	a1; a2; a3; b1; b2; b3; c1; c3; d1
Number of Weeks /and Units Per Semester			14	24	

B – Case Studies and Practical Aspect: (if any)				
Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	- Introduction	1	1	c1; c2
2	Microscopical examination of cell contents: starch grains, calcium oxalate & carbonate crystals and phloem fibres. & stomatas	1	1	c1; c2
3	<ul style="list-style-type: none"> - Introduction to morphology and anatomy of leaves - Macro & micromorphological study of Senna leaflets. 	1	1	c1; c2
4	- Macro & micromorphological study of solanaceous leaves (Hyoscyamus, Datura and Belladonna).	1	1	c1; c2
5	- Macro & micromorphological study of Digitalis leaves	1	1	c1; c2
6	- Macro & micromorphological study of Cinnamon bark	1	1	c1; c2
7	- Microscopic examination of stem monocot and dicot	1	1	c1; c2

	plants.			
8	- Microscopic examination of root monocot and dicot plants.	1	1	c1; c2
9	- Macro & micromorphological study of examples for the medicinally used seeds : linseed and black mustard	1	1	c1; c2
10	- Macro & micromorphological study of examples for the medicinally used seeds: nux vomica and marking of practical notes	1	1	c1; c2
11	- Macro & micromorphological study of examples for the medicinally used fruits : Anise and fennel	1	1	c1; c2
12	- Macro & micromorphological study of examples for the medicinally used fruits: corainder, Ammi visnaga and capsicum	1	1	c1; c2
13	- Unorganized drugs examples: Gums, gelatin, aloes and resins and resin combinations	1	1	c1; c2
14	- General chemical tests for the major classes of secondary metabolites present in plants.	1	1	c1; c2
Number of Weeks /and Units Per Semester		14	14	

VI. Teaching strategies of the course:

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

V. Assignments:

No	Assignments	Mark	Week Due	Aligned CILOs(symbols)
1	Participation	2.5	Weekly	a1; a2; a3; b1; b3;c1; d1
2	Quizzes	2.5	Weekly	a1;a2; a3; b1; b3;c1
3	Research	2.5	6 th W	a1; a3; b1; b2; c1; d1; d2
4	Assignments	2.5	6 th W	a1; a2; a3; b1; b3;c1; c2; d1
5	Mid – Exam (theoretical)	10	7 th W	a1; a2; a3; b1; b3
	Final Exam (practical)	30	15 th W	a1; b2; c1; c2
	Total score	50%		

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	Fortnightly	5	5%	a1; a2; a3; b1; b3;c1; c2; d1
2	Quizzes	W6	2.5	2.5%	a1;a2; a3; b1; b3;c1
3	Mid-Term exam	W8	10	10%	a1; a2; a3; b1;

					b3
4	Practical reports	W12	2.5	2.5%	a1; b2; c1; c2; d1
5	Final exam practical	W 15	30	30%	a1; b2; c1; c2
6	Final Exam theory	W16	50	50%	a1; a2; a3; b1; b3
Total			100	100%	

VI. Learning Resources:	
<ul style="list-style-type: none"> • <i>Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).</i> 	
1- Required Textbook(s) (maximum two).	
	<ol style="list-style-type: none"> 1. Trease G.E. and Evans W.C., “Pharmacognosy”, William C. Evans Edinburgh, London, New York, Philadelphia, Sydney, Tornoto. 16th Ed. (2009). 2. Pharmacognosy and Phytochemistry. 2end edition Bruneton Jean, Springer verlag, 2008,
2- Essential References.	
	<ol style="list-style-type: none"> 1. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi. 2. Fundamentals Pharmacognosy and Phytotherapy (by M. Heinrich et al), Chirchil Livingston publi company (2004).
3- Electronic Materials and Web Sites etc.	
	<p>http://www.bestnetcraft.com/spicy_recipes.pdf -http://www.herbdatanz.com/index.htm - http://www.who.int/medicines/library/trm/medicinalplants.pdf http://www.herb.com/</p> <p>www.herbalgram.com</p>

Course Specification

I. Course Identification and General Information:						
١	Course Title:	Physiology II				
٢	Course Code & Number:	B1101222				
٣	Credit hours:	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		1		3
٤	Study level/ semester at which this course is offered:	Level 2, semester 2				
٥	Pre –requisite (if any):	B1101211				
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. Adel Ali AMRAN				
12	Date of Approval					

II. Course Description:

This course covers basic issues in human physiology, physiology of the circulatory, respiratory, nervous, digestive, excretory, endocrine and reproductive systems are covered.

III. Course Objectives:

By the end of the course, the student will have adequate basic knowledge of functions of different body systems, mechanisms underlying these functions and its regulation to maintain normal health state and homeostasis

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 fundamentals of general sciences and the basic and biomedical sciences and their relations to pharmacy profession.	a1. Describe the normal functions of the all human systems.
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	
A4	Define basic principles of drug: target identification, design, informatics, and mechanisms of action.	a2. Suggest the basic physiological measurements used to test different body functions
A5	Outline principles of clinical pharmacology, therapeutics and Pharmacovagelance	a3. Introduce the concept of internal environment and homeostasis.

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	Classify the synthetic and natural drugs according to their mechanism of action, systemic effect, therapeutic uses, contraindication and toxicity	b1. Analyze different mechanisms for regulation of all body systems.
B3	Solve problems to reduce drug therapy problems	b2. Integrate physiology with other basic and clinical sciences

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	Handle the chemical, biological, and pharmaceutical materials safely	c1. Comprehend the general physiologic principles of the performance of the human body.
C2	Operate different pharmaceutical equipment and instruments	c2. Perform a systematic examination of all the human systems
C1	Handle the chemical, biological, and pharmaceutical materials safely	c3. Present physiological scientific data in a graphical form

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	Communicate effectively and ethically with patients, public, and health care professionals	d1. Work individually or in a team to research and prepare a scientific topic
D3	Work effectively individually and in a team	
D3	Use information systems and computer softwares in order to enhance the delivery of pharmaceutical care	d2. Use available presentation aids (e.g Overhead Projectors or Data Show) to present clearly and effectively a scientific topic in a seminar, or the yearly scientific day

V. Alignment Course Intended Learning Outcomes		
(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Describe the normal functions of the all-human systems.	<ul style="list-style-type: none"> - Interactive lectures. - Video. 	<ul style="list-style-type: none"> - Quiz - Attendance

a2. Suggest the basic physiological measurements used to test different body functions	<ul style="list-style-type: none"> - Interactive lectures. - Video. - Seminars. 	<ul style="list-style-type: none"> - Quiz - Attendance - Seminars
a3. Introduce the concept of internal environment and homeostasis.	<ul style="list-style-type: none"> - Interactive lectures. - Video. - Seminar 	<ul style="list-style-type: none"> - Quiz - Attendance - Seminars
(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Analyze different mechanisms for regulation of all body systems.	<ul style="list-style-type: none"> - التفكير الناقد وحل المشكلات - العصف الذهني 	<ul style="list-style-type: none"> - Quiz - Attendance - Reports - Oral exam - Discussion
b2. Integrate physiology with other basic and clinical sciences		

(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. support the theory and help students to comprehend the general physiologic principles of the performance of the human body	<ul style="list-style-type: none"> - Practical training in the lab. - 	<ul style="list-style-type: none"> - Quiz - Attendance - Reports - Home work
c2. Performing hematological tests		
c3. Present physiological scientific data in a graphical from		
(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 individually or in a team to research and prepare a scientific topic	<ul style="list-style-type: none"> - Seminar - Research topic 	Discussion Report
d2. Use available presentation aids (e.g Overhead Projectors or Data Show) to present clearly and effectively a scientific		

topic in a seminar, or the yearly scientific day.		
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V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Cardiovascular system	<ul style="list-style-type: none"> - Functional Anatomy of the Heart - Heart muscle properties - Cardiac Cycle - Heart sounds - Cardiac Output - Electrocardiography (ECG) - The arterial system - The venous system - Regulation of the heart function - Arterial blood pressure - Hypertension and hypotension 	3	6	a1,a2,a3 d2 b2,C1
2	Autonomic nervous system.	<ul style="list-style-type: none"> - Autonomic nervous system divisions - Functions of autonomic nervous system 	2	4	a1,b2,d2
3	Respiratory system	<ul style="list-style-type: none"> - External respiration and internal respiration, - respiratory Mechanism - respiratory pressures - pulmonary ventilation - Oxygen carriage by the blood - Exchange of gases - Control of respiration - Hypoxia - Cyanosis - Artificial respiration 	2	4	a1,a2,B1 d2,C1

		- Some important definitions in respiration			
4	Urinary system	<ul style="list-style-type: none"> - Introduction, structure of the kidney, nephron function - Urine formation Blood flow through the kidney - Glomerular filtration rate, tubular reabsorption and secretion and active transport through tubular membrane, absorption capabilities of different tubule segment. - Plasma clearance and measure of GFR. - Diuresis and diuretics. - Artificial kidneys - Factors influencing urine formation. 	3	6	a1,a2,B1 d2,C1
5	Endocrine system	<ul style="list-style-type: none"> - Physiology of endocrine system Classification of hormones Polarity of the hormones Mechanisms of Hormone action - Posterior pituitary Hypothalamic control of Posterior pituitary oxytocin and ADH, Anterior pituitary hormone - Adrenal cortex hormones, Thyroid gland hormones - Parathyroid hormones - islet of Langerhan insulin Glucagon, Pineal gland, sex hormone 	2	4	a1,a2,a3 d2
6	Gastrointestinal system	<ul style="list-style-type: none"> - Physiology of GIT functions of Mouth, salivary glands, pharynx, Small intestine. - Digestion and absorption of Nutrients, carbohydrate, proteins AND lipids - large intestine and rectum, 	2	4	a1,a2,a3 d2

		<ul style="list-style-type: none"> defecation reflex - Liver and pancreas - importance of bile - Functions of pancreatic - Enzymes and its roles In digestion 			
	Med exam	-	1	2	a1-a3 b2, c2,d1
	Final exam	-	1	2x3`	a1-a3,b1 b2, c2
Number of Weeks /and Units Per Semester			16	34	

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

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Stethography: Recording of Normal and Modified Movements of Respiration	2	4hr/ group	a2,b1,b2 c1,c2,c3 d1,d2
2	Determination of Breath Holding Time (BHT)	1	2hr/ group	
3	Spirometry (Determination of Vital Capacity, Peak Expiratory Flow Rate, and Lung Volumes and Capacities)	1	2hr/ group	
4	Artificial respiration	2	4hr/group	
5	Recording of Systemic Arterial Blood Pressure	2	4hr/ group	
6	Blood Pressure and Heart Rate	6	12hr/ group	

	<p>Cardiac Efficiency Tests (Exercise Tolerance Tests)</p> <p>Demonstration of Carotid Sinus Reflex</p> <p>Demonstration of Venous Blood Flow</p> <p>Recording of Venous Pressure</p> <p>Electrocardiography (ECG)</p> <p>Experiments on Student Physiography</p>			
14	Med exam and final exam	2	4hr/ group	
Number of Weeks /and Units Per Semester 16			32	

VI. Teaching strategies of the course:

1. Interactive lectures.
2. Video.
3. Seminars.
4. Practical training in the lab.

VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Seminar and quiz	a1,a2,a3,a4,b1,b2,c1,d1,d2	continuous	5
	Attendance	a1,a2,a3,a4,b1,b2,c1,d1,d2	continuous	5

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning
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					Outcomes
1	Quiz and seminar	Continuous	5	5%	a1- a4,b1,b2,c1,c3,d1
2	Attendance	Continuous	5	5%	a1- a4,b1,b2,c1,c3,d1
3	Written Med-year Test	6	10	10%	a1- a4,b1,b2,c1,c3,d1
4	Practical Med-year exam & Lab. Reports	7	10	10%	c1- c3
5	Practical Final exam	13	20	20%	c1- c3
	Final Exam (Oral & Written)	16	50	50%	a1- a4,b1,b2,c1,c3,d1
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- 1-K Sembulingam & Prema Sembulingam (2012) .6th ed. Essentials of Medical Physiology. Jaypee Brothers Medical Publishers
- 2- Guyton AC & Hall JE (2011) Textbook of Medical Physiology. 12th ed. Philadelphia: Saunders
- 2- William F. Ganong (2009) Review of medical physiology. Twenty fourth edition..Mc Graw Hill. LIBRAIRE DU LIBAN

2- Essential References.

- 1- VANDER'S HUMAN PHYSIOLOGY: THE MECHANISMS OF BODY FUNCTION. 13th ed. McGraw-Hill. United States of America
- 2- Lectures notes

3- Electronic Materials and Web Sites etc.

- 1- online tutori2- <http://www.bpcc.edu/sciencealliedhealth/humanphysiologylinks.html>
- 1- MasteringA&P (www.masteringaandp.com)
- 2- www.learnsmartadvantagedemo.com

Course Specification Analytical chemistry

Faculty: Faculty of Medical Sciences					
Program: Pharma D					
I. Course Identification and General Information:					
1	Course Title:	Analytical chemistry			
2	Course Code & Number:	B1102114			
3	Credit hours:	C.H			
		Th.	Seminar	Pr.	Tr.
		2		1	
		TOTAL			3
4	Study level/ semester at which this course is offered:	2 nd year 2 nd semester			
5	Pre –requisite (if any):	B1101122			
6	Co –requisite (if any):				
7	Program (s) in which the course is offered:	Pharma D			
8	Language of teaching the course:	English			
9	Location of teaching the course:	Thamar university, Faculty of Medical Sciences			
10	Prepared By:	PROF.DR. DAIEKH ABED ALI ABOD			
11	Date of Approval				

II. Course Description:

This course covers the principles of analytical chemistry including errors in chemical analysis, statistical evaluation of analytical data, gravimetric methods of analysis, titrimetric methods of analysis, aqueous solution chemistry, activities and activity coefficients, also study the ionic strength effect on concentration and Debye-Huckel theory, a systematic method for performing equilibrium calculations and precipitation titration of silver nitrate including Mohr, Volhard and Fajan methods

I. 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	Describe the applied chemical principles used for separation, detection, identification, and quantification of samples constituents.
A1	a2	Demonstrate understanding of statistical principles for chemical analysis
A1	a3	Describe qualitative and quantitative analysis, i.e., concepts of acid-base, redox reactions, precipitation reactions, titrimetric analysis,

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 difference between salt, acid and buffer and Use data of acid-base reactions to calculate concentrations of unknown sample.
B1	b2	Select suitable methods, conditions to analyze a given compound by volumetric and gravimetric method.
B1	b3	Interpret issues in chemistry with reference to the practices of the international scientific community.

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 Prepare standard solutions to be used for quantitative analysis of different unknown samples and Calculate concentrations of different acids or bases as well as, pH values of different solutions
C2	c2 Use lab equipment's to collect data for volumetric analysis (Acid – base, complexometry, and precipitometry)
C1	c3 Handle basic analytical tools safely and efficiently.

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 as a part of teamwork in performing the experimental work.
D1	d2 Communicate clearly with colleagues and academic staff.
D4	d3 Effectively use of the library and other information resources in chemistry, including the primary literature, tabulated data, and secondary sources such as the internet

I.	II. 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	Describe the applied chemical principles used for separation, detection, identification, and quantification of samples constituents.	- Lectures - Discussions - Exercises - Illustration	- Written Examinations Homework
a2	Demonstrate understanding of statistical principles for chemical analysis	- Lectures - Seminar - Discussions - Electronic learning	- Written examinations - Homework - Quiz
a3	Describe qualitative and quantitative analysis, i.e., concepts of acid-base, redox reactions, precipitation reactions, titrimetric analysis	-Lectures, Seminar -Discussions -Electronic learning	- Written examinations - Quiz - 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 difference between salt, acid and buffer and Use data of acid-base reactions to calculate concentrations of unknown sample.	-Interactive Lecture -Exercises -Discussions -Problem-Solving -Brainstorming	-Written Examinations. -Problem-Solving Exercises. Lab report.
b2	Select suitable methods, conditions to analyze a given compound by volumetric and gravimetric method.	-Problem-solving method -laboratory session and experimental design exercises.	Homework, Quizzes, Evaluation laboratory reports.
b3	Interpret issues in chemistry with reference to the practices of the international scientific community	-Interactive Lecture -Problem-Solving -Brainstorming	-Written Examinations. -Problem-Solving Exercises. Lab report
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	Prepare standard solutions to be used for quantitative analysis of different unknown samples and Calculate concentrations of different acids or basses as well as, pH values of different solutions	- Practical Sessions - Exercises - Discussions - Problem-Solving Individual/Group Project	-practical exam -Individual/Group Project -Technical/Practical Reports
c2	Use lab equipment's to collect data for volumetric analysis (Acid – base, complexometry, and precipitemetry	-Practical Sessions -Exercises	Practical exam -Technical/Practical Reports
c3	Handle basic analytical tools safely and efficiently.	Practical Sessions -Exercises	Individual/Group Project Technical/Practical 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 as a part of teamwork in performing the experimental work.	-Laboratory session -Group discussion	Practical exam Group assignment
d2	Communicate clearly with colleagues and academic staff.	Seminar, class presentation	Seminar, class presentation, oral exam
d3	Effectively use of the library and other information resources in chemistry, including the primary literature, tabulated data, and secondary sources such as the internet	Tutorial Electronic learning	Assignment, oral presentation Oral exam

III. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Learning Outcomes	Number of Weeks	contact hours
1	Introduction	Concept of molarity, normality, formality molarity. Measurement units	a3,b3,d3	3	6
2	pH and buffer	Concept of PH, measurement oh PH. Buffer solutions and practical applications	a1,a3,b1,d2,d3	2	4
3	Acid- Base titration curve	Acid-base reactions and theories of neutralization indicators	a1,a2,a3,b1,b2,d3	2	4
4	Midterm exam		a1,a2,a3,b1,b2,d3	1	2
5	titration curve	Titration curves of different neutralization reactions and Application problems	a1,a2,a3,b1,b2,d3	2	4
6	Principles of oxidation-reduction reactions	Principles of oxidation-reduction reactions Titration curves	a2,a3,b2,b3,d2,d3	2	6

		and redox indicators The applications of standard potential in chemistry			
7	Formation of a precipitate and solubility product	Formation of a precipitate and solubility product - Problems on solubility product -Mohr's method + Volhard's -Denig's + lebig's methods -Fajan's method	a1-a3,b1-b3, d2, d3	3	6
8/	Review		a1-a3,b1-b3,d2, d3	1	2
9	Final exam		a1-a3,b1-b3, d2, d3	1	2
Number of Weeks /and Units Per Semester				16	32
Number of Weeks /and Units Per Semester					

B - Practical Aspect: (if any)				
Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	The rules of safety and fluency in laboratory work.	1	2	b3,c3,d1,d2

2	Use of the analytical balances and glassware uses in the analytical experiments	1	2	b2,c2,d1,d2
3	Titration of strong acid with strong base. Preparation of some biological buffer solutions	1	2	c1,c2,b1,b2, d1,d2
4	Determination of alkalinity of anti-acid tablets.	1	2	c1,c2,b1,b3, d1,d2
5	Determination of benzoic acid in soda drink.	1	2	c1,c2,b2,b3, d1,d2
6	Determination of bicarbonate in blood using back titration.	1	2	c1-c3,b2,b3,,d1,d2
7	Midterm exam	1	2	c1-c3,b1-b3,,d1,d2
8	Determination of vitamin C by titration with standard iodine solution, or analysis of commercial hydrogen peroxide solution by Iodometric titration.	1	2	b2,b3,c1-c3,d1,d2
9	Determination of the total hardness of water by EDTA titration.	1	2	b2,b3,c1-c3,d1,d2
10	Determination of chloride in a soluble chloride, Fagans' method.	1	2	b2,b3,c1-c3,d1,d2
11	Gravimetric determination of chloride in a soluble chloride or Sulfur in a soluble Sulfate.	1	2	b2,b3,c1-c3,d1,d2
12	Determination of alkalinity of anti-acid tablets.	1	2	B2,b3,c1-c3,d1,d2
13	Final exam	1	2	Bv1-b3,c1-c3,d1-d2
Number of Weeks /and Units Per Semester		13	26	

IV. Teaching strategies of the course:

Interactive Lectures, Discussion, Self Learning, Presentation, Seminars, Brain storming, Laboratory demonstrations, Laboratory practice, Group discussion., Animations and videos, Lab. Visits

V. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Seminar	d2,d3	5,6	3%
3	Presentation	d2,d3	8,9	2%

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
	Seminar	5,6	3	3%	d2,d3
	Presentation	8,9	2	2%	d2,d3
1	oral		5	5%	d2
2	Midterm practice exam	7	10	10 %	c1-c3,b1-b3,,d1,d2
3	Mid-Term Theoretical Exam	8	10	10%	a1,a2,a3,b1,b2,d3
4	Logbook(Practical report)	Weekly	10	10 %	b3,b2,c1-c3

5	Final Practical Exam	14	20	20 %	bv1-b3,c1-c3,d1-d2
6	Final theoretical exam	15	40	40%	a1-a3,b1-b3, d2, d3
7	Total		100	100%	

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- Douglas A. Skoog, (2017), Principles of Instrumental Analysis 7th Edition, Cengage Learning; Boston MA 02210, US. SBN-13: 978-1305577213
- 2- Gary D. Christian, Purnendu K. Dasgupta, Kevin A. Schug (2020), Analytical Chemistry, 7th Edition, International Adaptation, Verlagsgruppe John Wiley & Sons, Inc. mit Sitz in Hoboken, New Jersey, USA
- 3- Skoog, West, Holler & Crouch- 2014, Analytical Chemistry -9th Edition, Thomson Brooke-Cole.

2- Essential References.

- 1- Chemistry: Inorganic Qualitative Analysis in the Laboratory, Clyde Metz, Academic Press (2 Dec. 2012).
- 2- Robert J. Flanagan, Eva Cuypers, Hans H. Maurer, Robin Whelpton,(2020), Fundamentals of Analytical Toxicology: Clinical and Forensic, 2nd Edition, Wiley & Sons, Inc. mit Sitz in Hoboken, New Jersey, USA

3- Electronic Materials and Web Sites etc.

- 1- <https://libguides.utoledo.edu/c.php?g=284200&p=1895175>
- 2- <https://home.asdlib.org/>
- 3- <http://www.science-and-fun.de/tools/>

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 Organic Chemistry II

I. Course Identification and General Information:					
1	Course Title:	ORGANIC CHEMISTRY II			
2	Course Code & Number:	B1101235			
3	Credit hours:	C.H			TOTAL
		Th.	Seminar	Pr	
		2		1	
4	Study level/ semester at which this course is offered:	2 nd year SEMESTER TWO			
5	Pre –requisite (if any):	B1101224			
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:	COLLEGE OF MEDICAL SCIENCES			
11	Prepared By:	PROF. DR DAIKHA ABED ALI ABOD			
12	Date of Approval				

II. Course Description:

The aim of the courses is to provide students with proper understanding of the basic principles of aromaticity and heterocyclic chemistry. In addition, providing students with reactions and mechanisms of aromatic compounds. The students will also be capable to synthesize certain organic compounds and recognize their physicochemical properties

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)

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,A3	a1-Represent various structural and molecular formulas of different aromatic and heterocyclic organic compounds.
A1,A3	a2--Name the majority of aromatic and heterocyclic structures and draw the structure of any chemical name.
A4	a3-Enumerate the theories of identification, synthesis, and purification of different aromatic and heterocyclic compounds.
A5	a4-Identify different organic functionalities, their properties, introduction and transformation to each other, concerning aromatic and heterocyclic compounds.

Intellectual Skills :

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

Intellectual Skills PILOs	Intellectual Skills CILOs
After completing this course, students would be able to:	After completing this program, students would be able to:
B3	b1- Design appropriate methods for synthesis and purification of selected aromatic and heterocyclic compounds
B1	b2-Think critically about the chemistry of aromatic and heterocyclic organic compounds and relate their specific structural features to possible synthesis,

	identification and physicochemical properties
B1	b3- Analyze the organic chemistry data and principles essential for comprehension of other applied chemistry sciences

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 course, students would be able to:	After completing this program, students would be able to:
C3, c1	c1- Perform chemical synthesis of selected organic compounds effectively and safely.
C3	c2- Determine the physicochemical characteristics of different aromatic and heterocyclic compounds
	c3- Record data and write practical chemical reports.

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:	After completing this program, students would be able to:
D3	d1-Work effectively in a team
D4	d2- Practice self-learning and long-life 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-Represent various structural and molecular formulas of different aromatic and heterocyclic organic compounds.	Active lecture, discussion, electronic learning, excercise, problems solving, self-learning, seminar	Written exam, quiz, assignment, homework. And Oral exam.
a2--Name the majority of aromatic and heterocyclic structures and draw the structure of any chemical name.		
a3-Enumerate the theories of identification, synthesis, and purification of different aromatic and heterocyclic compounds.		
a4-Identify different organic functionalities, their properties, introduction and transformation to each other, concerning aromatic and heterocyclic compounds.		

(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 synthesis and purification of selected aromatic and heterocyclic compounds	brainstorm, tutorial, seminar problem solving, electronic learning, group discussion, assignment, laboratory work, video and animation	Written exam, quiz, assignment, homework And Oral exam.
b2-Think critically about the chemistry of aromatic and heterocyclic organic compounds and relate their specific structural		

features to possible synthesis, identification and physicochemical properties		
b3- Analyze the organic chemistry data and principles essential for comprehension of other applied chemistry sciences		

(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 chemical synthesis of selected organic compounds effectively and safely.	Laboratory session, videos animation, tutorial, laboratory demonstration.	Practical exam, lab performance, lab reports, practical assignment report
c2- Determine the physicochemical characteristics of different aromatic and heterocyclic compounds		
c3- Record data and write practical chemical 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 in a team	Lecture, group discussion, electronic learning, laboratory session.	Oral exam, presentation, assignment report, lab performance report.
d2- Practice self-learning and long-life learning		

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Aromatic Compounds	Aromatic Compounds: Structure of benzene, The concept of Aromaticity, Nomenclature, Electrophilic Aromatic Substitution, Reactivity and Orientation	1	2	a1,a2,a3,b1,b2,d1
2	Nucleophilic Aromatic	Nucleophilic Aromatic Substitution, Benzene and its Homologues: synthesis and reactions, Polynuclear Hydrocarbons.	1	2	a1,a2,a4,b2,d2
3	Aryl Halides	Aryl Halides: Nomenclature of Aryl Halides, Structure of Aryl Halides, Physical Properties of Aryl Halides, Preparation of Aryl Halides, Nucleophilic Aromatic Substitution.	1	2	a1,a2,a3.a4,b1,b2,d1
4	Aromatic Nitro Compounds:	Aromatic Nitro Compounds: Physical properties of nitro compounds, Preparation of nitro compounds, Reactions of nitro compounds, Importance of nitro compounds in synthetic pathways.	1	2	a1,a2,a3.a4,b1,b3,d1
5	Aromatic Amines	Nomenclature of amines, Structure of amines and the basicity concept, Physical properties of amines. Preparation of amines. Reactions of amino compounds.	1	2	a1,a2,a3.a4,b1,b2,d2
6	Aromatic diazonium salts	stability relative to aliphatic salts, mechanism of diazotization, nomenclature, reactions with retaining of nitrogen [coupling with phenols and amines, reduction], reactions with replacement of nitrogen [by hydrogen, OH, Cl or Br (Sandmeyer reaction,	1	2	a1,a2,a3.a4,b1,b2,d2, c2,d2

		gattermann reaction), Schiemann reaction, CN, NO ₂ .			
7	Midterm exam 9 th		1	2	a1,a2,a3.a4,b1, b2,d2,d2
8	Phenols:	Phenols: Structure of phenols. Classification and Physical Properties of phenols. Preparation of phenols. Chemical Properties: acidity, ring substitution. Pharmaceutical importance of phenols.	1	2	a1,a2,a3.a4,b1, b2,d2
9	Aromatic sulfonic acids	Aromatic sulfonic acids: preparation, properties, reactions [formation of acid chlorides, esterification, desulfonation, conversion to phenols, ring substitution], important derivatives [Chloramines T, Dichloramine T, Saccharine and Sulfonamides].	1	2	a1,a2,a3.a4,b1, b2,d2
10	Aromatic Aldehydes and Ketones:	Aromatic Aldehydes and Ketones: Structure of aldehydes and ketones. Nomenclature aldehydes and ketones. Physical Properties of aldehydes and ketones. Preparation of aldehydes and ketones. Nucleophilic addition Reactions. Reaction at the α - carbon. Oxidation and reduction reactions.	1	2	a1,a2,a3.a4,b1, b2,b3,d2
11	Aromatic Carboxylic Acids	Aromatic Carboxylic Acids and Their Derivatives: Structure of Aromatic Carboxylic Acids and Acidity Concept Nomenclature Aromatic Carboxylic Acids. Physical Properties of Aromatic Carboxylic Acids. Preparation of Aromatic Carboxylic Acids. Chemical Properties of Aromatic Acids. Carboxylic Acids derivatives: acid chlorides, acid anhydrides, acid esters, acid amides, nitriles. Preparation of Carboxylic Acids Derivatives. Reactions of	1	2	a1,a2,a3.a4,b1, b2,b3,d2

		Carboxylic Acids Derivatives. Saturated and Unsaturated Dicarboxylic Acid.			
12	Heterocyclic Chemistry	Heterocyclic Chemistry Nomenclature, Classification of heterocycles and Reactivity of heterocycles. Five-membered Heterocycles Typical reactivity of five membered heterocycles, Synthesis and Reactions of Pyrrole, Thiophen, Furan, Synthesis and Reactions of indole and benzothiophene, benzofuran.	2	4	a1,a2,a3.a4,b1, b2,b3,c3,d2
13	Six-membered Heterocycles	Six-membered Heterocycles, Typical reactivity of pyridine, quinolines and Isoquinolines, Synthesis and Reactions pyridine, quinoline and isoquinoline, Typical reactivity of pyridazine, pyrimidine and pyrazine, Synthesis and Reactions of pyridazine, pyrimidine and pyrazine.	1	2	a1,a2,a3.a4,b1, b2,b3,c2, d2
	Review		1	2	
	Final exam		1	2	a1,a2,a3.a4,b1, b2,b3,c2, d1, d2
Number of Weeks /and Units Per Semester				16 weeks	32

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

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes (CILOs)
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1	Hazards in the chemistry laboratory, hazards from dangerous chemicals	1	2	c1,
2	Organic Preparations: Benzoic acid, Aspirin, Acetanilide, Iodoform, Nitrophenol, 3-nitrophthalic acid, Benzhydrol and 2,4- Dinitrochlorobenzene	2	4	c1-c3
2	Synthesis of ethyl acetate	1	2	c1-c3,b1-b3,d1
	Synthesis of methyl salicylate	1	2	c1-c3,b1-b3,d1
	Synthesis of acetanilide Synthesis of iodoform	1	2	c1-c3,b1-b3,d1
	Midterm exam	1	2	c1-c3,b1-b3,d1
3	Identification of functional groups; Carboxylic group and hydroxyl group	1	2	c1-c3,b1-b3,d1
4	Synthesis of nitronaphthalene, Synthesis of diazoaminobenzene	1	2	c1-c2, b1,b2, d1,d2
	Synthesis of diazoaminobenzene	1	2	c1-c3,b1-b3,d1
	Study chemophysical properties of some medicine	2	4	c1-c2, b1,b2, d1,d2
	Preparation of O-chlorobenzoic acid from O-chlorotolune Preparation of	2	4	c1-c3,b1-b3,d1

	cyclohexanone from cyclohexanol			
	Final exam	1	2	c1-c3,b1-b3,d1
Number of Weeks /and Units Per Semester			15	30

VI. Teaching strategies of the course:

Lecture, group discussion, Brain storming, Reinforcements- homework, Hand-outs, worksheets, Power-point presentations/ Group presentation , Laboratory practices , electronic learning

VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Assignments & Homework, Tasks & Presentation	b1,b2,d1,d2	3, 9, 14	5%
2	Practical reports	b2,c3	Every week	5%
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	Quizzes	5 , 12	5	5%	b1,b2,d1
2	Assignments & Homework, Tasks & Presentation	3, 7, 14	5	5%	b1,b2,d1,d2
3	Mid-Term exam	9	20	20%	a1,a2,a3.a4,b1, b2,d2,d2
4	Practical reports, and exam	7	10	10%	c1-c3, b1,b2, d1
5	Final exam practical	15	20	20%	c1-c3,b1-b3,d1
6	Final Exam theory	16	40	40%	a1,a2,a3.a4,b1, b2,b3, 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- Sykes, A.P. A Guide Book to Mechanism in Organic Chemistry. 6 th Ed., Lonsmen Co. 2009. London, UK.
- 2- David R. Klein . Organic Chemistry, John Wiley & Sons Inc., New York, 2015.
- 2- Graham Solomons, Craig Fryhle, Textbook of Organic Chemistry, “11th edn.”, John Wiley & Sons Inc., New York, 2014.

2- Essential References.

William L. Masterton, Cecile N. Hurley, Edward Neth, Chemistry: Principles and Reaction
7th Edition 2012: ISBN-10: 1111427100

3- Electronic Materials and Web Sites etc.

Electronic Materials and Web sites

<http://chemed.chem.purdue.edu/genchem/topicreview/index.php>
<http://www.whfreeman.com/vollhardtschore5e>

http://en.wikipedia.org/wiki/Organic_chemistry

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. -
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Course Specification of Microbiology I

I. Course Identification and General Information:					
1	Course Title:				
2	Course Code & Number:	B1101244			
3	Credit hours: 3	C.H			Total
		Th.	Seminar	Pr.	
		2		1	
4	Study level/ semester at which this course is offered:	2nd level/ 2nd semester			
5	Pre –requisite (if any):				
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	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 is designed to enable students to acquire understanding of fundamentals of Microbiology, compare and contrast different microbes and comprehend the means of transmission and spread by various microorganisms. The course describes the structure, classification and growth of the microorganisms of medical importance and demonstrates the physical and chemical methods used to control microorganisms. The natural factors in immunity and the types of immunity are also presented.

III. Course Objectives:

The overall aims of the course are:

1. TO classify and explain the morphology and growth of microbes.
2. TO explore mechanisms by which microorganisms cause disease.
3. TO develop understanding of how the human immune system counteracts infection by specific and

non-specific mechanisms.

- To identify the contribution of the microbiologist and the microbiology laboratory to the diagnosis of infection

IV. Course Intended Learning Outcomes (CILOs) :

Knowledge and Understanding:

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

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

Knowledge and Understanding PILOs		Knowledge and Understanding CILOs	
After completing this program, students would be able to:		After completing this course, students would be able to:	
A2	Demonstrate understanding of the principles and procedures of Biochemical, Hematological, Immunological, Microbiological and Parasitological Sciences as well as Blood Banking in laboratory investigation.	a1	Integrate knowledge to Microbiology and scope of Microorganisms on our daily life.
A3	Define and describe the mechanisms of various metabolic processes in the physiological and pathological conditions.	a2	Understand the basic microbial nutritional, physical and chemical requirements and the significance of controlling the microbial growth
		a3	Identify the microbial structure, understand their role in the pathogenicity and understand host pathogen interaction

Intellectual Skills :

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

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

Intellectual Skills PILOs		Intellectual Skills CILOs	
After completing this program, students would be able to:		After completing this course, students would be able to:	
B1	Integrate the concepts and principles of the basic and applied Medical Sciences to formulate and test hypothesis	b1	Explain concepts and principles of microbiology and its importance in laboratory medicine
B3	Use critical thinking and problem solving skills to make evidence-based decisions.	b2	Describe the different disease producing organisms.

		b3	Introduced to some essential antimicrobial agents and their mechanism of action and the development of antimicrobial resistance
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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:	
C2	Apply technical skills in using laboratory equipment, tools, and materials in laboratory practice.	c1	Able to differentiate between some basic and special microbial media for isolating and transporting the pathogen
C3	Collect, transport, preserve and store samples according to Standard Operating Procedures (SOPs).	c1	Able to differentiate between some basic and special microbial media for isolating and transporting the pathogen
		c3	Carry out of advanced practical skills, such as clinical specimens' collection of pathogenic microorganisms.
C4	Employ different methods in the diagnosis of various Biochemical, Hematological, Immunological, Microbiological, Parasitological and pathological diseases.	c2	use of Microscope to observe and differentiate between microorganisms
		c3	Carry out of advanced practical skills, such as clinical specimens' collection of pathogenic microorganisms

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	Participate in teamwork harmoniously and exhibit collaboration with colleagues and other health care professionals.	d1	Demonstrate ethical conduct with patients and health care workers.
D6	Conduct research projects in the field of Laboratory medicine with sense of social responsibility	d2	Conduct research projects in the field of Laboratory medicine with society.

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 Integrate knowledge to Microbiology and scope of Microorganisms on our daily life.	<ul style="list-style-type: none"> - Lectures - Discussion Sessions 	<ul style="list-style-type: none"> - Periodic exam (Quizzes) - Evaluate assignments - Mid & final exam
a2 Understand the basic microbial nutritional, physical and chemical requirements and the significance of controlling the microbial growth.		
a3 Identify the microbial structure, understand their role in the pathogenicity and understand host		

(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 concepts and principles of microbiology and its importance in laboratory medicine.	<ul style="list-style-type: none"> - Discussion Sessions - Problem solving - Group discussion 	<ul style="list-style-type: none"> - Oral presentations - Evaluate assignments - Mid & final exam
b2 Describe the different disease-producing organisms.		
b3 Introduced to some essential antimicrobial agents and their mechanism of action and the development		

(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 Able to differentiate between some basic and special microbial media for isolating and transporting the pathogen	<ul style="list-style-type: none"> - Practical discussion 	<ul style="list-style-type: none"> - Oral presentations - Practical exams - LAB report
c2 Use of Microscope to observe and differentiate between microorganisms.		

c3	Carry out of advanced practical skills, such as clinical specimens' collection of pathogenic microorganisms		
(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:			
Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
d1	Demonstrate ethical conduct with patients and health care workers.	- Group discussion - Collecting information from the internet.	- Oral presentations
d2	Conduct research projects in the field of Laboratory medicine with society		

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Introduction to microbiology	- Microbial taxonomy. - Principles of microbiology.	1	2	a1, a2, a3, b1, b2
2	General characteristics of Microbes	- Structure and classification of Microbes - Morphological types, Size and form of bacteria - Motility and Colonization - Microbial growth and Basic Chemical and physical requirements. - Sterilization and disinfection (Control of Microbial growth). - Culture Media and staining.	3	6	a1, a2, a3, b1, b2, c1
3	Culture media	- Culture and media Types and preparation. - Semi synthetic, synthetic, enriched, enrichment, selective and differential media. Pure culture techniques. - Tube dilution, pour, spread, streak plate. Anaerobic cultivation of	2	4	a1, a2, b2, b3, c1, c2

		<ul style="list-style-type: none"> bacteria. - Specimen collections and transportations Media 			
4	Pathogenic organisms	<ul style="list-style-type: none"> - Characteristics, Source, portal of entry, transmission of infection, Identification of disease producing micro-organisms. - Microbial normal flora. - Pathogenic Micro-organisms - Cocci — gram positive and gram negative; Bacilli— gram positive and gram negative - Viruses - Fungi -Superficial and Deep mycoses - Parasites 	4	8	a1,a2, a3, b1,b2
	Immunity	<ul style="list-style-type: none"> - Immunity-Types, classification - Antigen and antibody reaction - Hypersensitivity reactions - Serological tests - Immunoglobulins – structure, types & properties - Vaccines -types & Classification, storage and handling, cold chain, Immunization for various diseases - Immunization Schedule 	2	4	A1,a2, b2
	Antimicrobial agents	<ul style="list-style-type: none"> - Importance of Antibiotic - Antimicrobial susceptibility testing, MIC, MBC. - Anti Microbial Resistance 	2	4	a3, b3,d1, d2
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	- Safety rule in Microbiology laboratory and	2	4	a1, c1, c2

	Instrumentations			
2	- Sterilizations and disinfectant	1	2	c2, c3
3	- Isolation of pure culture	1	2	a2, c3
4	- Simple staining, wet preparation and Microscopy	2	4	a1, c1, c2, c3
5	- Special stain (AFP) & Microscopy	1	2	a1, c1, c2, c3
6	- Specimen collections and transportations Media	2	4	a1, b2, c1, c2, c3
7	- Antimicrobial susceptibility testing, MIC, MBC	2	4	a3, b3, c1, c2, c3, d2
8	- Revision	1	2	a1, a3, c1, c2, c3, d1, d2
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	6 th W	
4	Assignments	2.5	6 th W	
5	Mid – Exam (theoretical)	20	7 th W	
	Final Exam (practical)	30	15 th W	
	Total score	60%		

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	20	20%	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; b1; b3;c1; c3; c4
6	Final Exam theory	W16	40	40%	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) Barer, M. R., & Irving, W. L. (2018). Medical Microbiology E-Book: A Guide to Microbial Infections (19th Edition). Elsevier Health Sciences.
- 2) Tille, P. (2015). Bailey & Scott's diagnostic microbiology-E-Book (14th Edition). Elsevier Health Sciences.
- 3)

2- Essential References.

- 1) Practical Handbook of Microbiology; By Goldman E, 2015, 3rd edition.
- 2) Gracia, L. (2016). Diagnostic Medical Parasitology (6th Edition). Washington, D.C. : ASM Press,

3- Electronic Materials and Web Sites etc.

- <https://uqu.edu.sa/lib/917>

Course Specification of Pharmaceutics I

I. Course Identification and General Information:					
1	Course Title:	Pharmaceutics I			
2	Course Code & Number:	B1101254			
3	Credit hours:	C.H			TOTAL
		Th.	Seminar	Pr	
		2		1	
4	Study level/ semester at which this course is offered:	2nd level/ 2nd semester			
5	Pre –requisite (if any):	Physical Pharmacy			
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 campus			
11	Prepared By:	Dr. Abdulkarim Kassem Alzomor			
12	Date of Approval	2021			

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. 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 role of pharmacist in formulation and the stages of designing a pharmaceutical dosage form.
a2 Explicit the general properties, the types and roles of excipients, advantages and disadvantages of pharmaceutical liquid 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	Explain the fundamentals of general sciences and the basic and biomedical sciences and their relations to pharmacy profession.	a1	Describe the role of pharmacist in formulation and the stages of designing a pharmaceutical dosage form.
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 liquid 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 dosage forms and categorize liquid dosage forms.
b2 Design liquid pharmaceutical 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 dosage forms and categorize liquid 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 liquid pharmaceutical 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:

- c1 Handle efficiently and safely the chemical materials and tools used in the laboratory.
c2 Operate the instruments and prepare liquid extemporaneous pharmaceutical dosage forms.

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 liquid extemporaneous pharmaceutical 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	Describe the role of pharmacist in formulation and the stages of designing a pharmaceutical dosage form.	- Lectures and Groups discussion.	- Quizzes, Written exam
a2	Explicit the general properties, the types and roles of excipients, advantages and disadvantages of pharmaceutical liquid dosage forms	- Practical presentations - Self - learning	

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:			
Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
b1	Classify pharmaceutical dosage forms and categorize liquid dosage forms	- Discussions and Training - Field visits - Problem solving	- Quizzes, Homework - Observation - Task's Evaluates
b2	Design liquid pharmaceutical dosage forms.		

(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:			
Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
c1	Handle efficiently and safely the chemical materials and tools used in the laboratory	- Discussions and Training - practical Lectures - Problem solving	- Quizzes, Homework - Observation - Practical exam
c1	Operate the instruments and prepare liquid extemporaneous pharmaceutical 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.	- Homework - Evaluates of Oral Presentation
d2	Participate efficiently with colleagues in a team work	- Self – learning - Inductive and deductive	

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Introduction To pharmaceuticals	Definitions and brief history of pharmaceuticals, pharmacopeia, Definition of dosage form, the components, the need to dosage forms, classification of dosage forms	1	2	a1, a2, b1, b2
2	Pharmaceutical excipients	<ul style="list-style-type: none"> - Roles, types with examples <ul style="list-style-type: none"> o Essential: solvents, vehicles, emulsifying agents, binders, etc. o Organoleptic excipients: colorants, sweeteners, flavors o Stabilizers: buffers, preservatives, antioxidants, anti-cake, etc. o Bioavailability enhancers o Excipients for other purposes 	1	2	a1, a2, b1,d2
3	Design of dosage form: Pre-formulation, Formulation and development	<ul style="list-style-type: none"> - Preformulation stage: physicochemical properties and analytical data required. Scheme of preformulation, Compatibility testing. - Formulation: general rules, sources of raw materials, economic impact - Development stage 	2	4	a1, a2, , b1, b2,d1
4	Old pharmaceutical dosage forms	<ul style="list-style-type: none"> - Definition; disadvantages of Galenicals, lozenges, cachets, pills, etc. 	1	2	a1, a2, b1, b2, d1
5	Introduction to Non-sterile Pharmaceutical solutions	<ul style="list-style-type: none"> - Definition of solutions, types, advantages, disadvantages, general method of preparation, enhancement of dissolution, excipients, types of waters 	1	2	a1, a2, b1, b2, d2

6	Aqueous Pharmaceutical solutions	<ul style="list-style-type: none"> - Definition, General characters, advantages, disadvantages, method of preparation, formulations and excipients with examples of - Topical : (aqueous Tinctures, Douches/washes, Enema, mouthwashes/gargle, nasal solutions, otic aqueous solutions) - Oral: Syrups, linctus's, Elixirs , other oral solutions. - Adjuvant: Aromatic waters, mucilage 	2	4	a1, a2, b1, b2, d1, d2
7	Non-Aqueous Pharmaceutical solutions	<ul style="list-style-type: none"> - Definition, General characters, advantages, disadvantages, method of preparation, formulations and excipients with examples of - Topical: Alcoholic Tinctures, Collodions, liniments, Glycerites (otic glycerite) - Oral: oleovitamins - Adjuvant: Spirit 	1	2	a1, a2, b1, b2, d1
8	Non-sterile liquid Dispersion systems	<ul style="list-style-type: none"> • Introduction Definition, types: coarse dispersion, fine dispersion; compare disperse system and true solution ; compare colloids, suspensions, emulsions; general advantages and problems of disperse systems • Coarse dispersions ➤ Suspensions <ul style="list-style-type: none"> ○ Definition, types, advantages , disadvantages, ideal properties ○ Formulation: (flocculated, deflocculated) , excipients (suspending agents, flocculating agents; others) ○ Steps of preparation ○ Instability Problems : sedimentation; cake formation; evaluation and approaches to reduce ○ Packaging ➤ Emulsions <ul style="list-style-type: none"> ○ Definition, types, advantages, 	3	6	a1, a2, b1, b2, d1, d2

		<p>disadvantages</p> <ul style="list-style-type: none"> ○ Formulation: excipients (Emulsifying agents; types and selection; HLB) ○ Methods of preparation: wet method, dry ○ method, bottle method ○ Self-emulsified emulsions ○ Instability problems: coalescence, braking, creaming, phase inversion; causes and how to reduce <ul style="list-style-type: none"> ● Fine dispersions Definition, types, advantages, disadvantages, principles and method of preparations <p>➤ Colloidal suspensions Microemulsions and nanoemulsion</p>			
Number of Weeks /and Units Per Semester			14	28	

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Course Intended Learning Outcomes CILOs
Aqueous solutions				
1.	Iodine tincture	1	2	b1, c1,c2, d1, d2,
2.	vaginal douches (sodium borate solution)	1	2	b1, c1,c2, d1, d2,
3.	simple syrup (BP; USP)	1	2	b1, c1,c2, d1, d2,
4.	Peppermint aromatic water	1	2	b1, c1,c2, d1, d2,
5.	Oral rehydration solution	1	2	b1, c1,c2, d1, d2,
6.	Preparation of elixir (paracetamol elixir)	1	2	b1, c1,c2, d1, d2,
Non-aqueous solutions				
7.	Peppermint spirit	1	2	b1, c1,c2, d1, d2,
8.	camphor liniment	1	2	b1, c1,c2, d1, d2,
9.	Otic glycerite	1	2	b1, c1,c2, d1, d2,
10.	calamine lotion (suspension)	1	2	b1, c1,c2, d1, d2,
11.	emulsions (castor oil emulsion)	1	2	b1, c1,c2, d1, d2,
12.	Revision	1	2	b1, 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.	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,b1,b2,c1, a2, d1,d2
2	Quizzes 1	5	2.5	2.5%	a1,a2, c1,b1
3	Mid-semester exam of theoretical part (written exam	7	10	10%	a1,a2,b1,c1, d1,d2
	Quizzes 2	12	2.5	2.5%	a2, b1, b2, c1, d1, d2
4	Lab.	1-10	5	5%	c1, c2,d1,d2
5	Term		5	5%	

	works					
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. 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.

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Course Specification of Phytochemistry

I. Course Identification and General Information:						
1	Course Title:	Phytochemistry				
2	Course Code & Number:	B1101272				
3	Credit hours:	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		1		3
4	Study level/ semester at which this course is offered:	<i>Level 2/ semester 2</i>				
5	Pre –requisite (if any):	B1101251				
6	Co –requisite (if any):					
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 – Dr. Ahmed Al-Washli				
11	Date of Approval	2021				

II. Course Description:

This course provides the students with the knowledge of the chemistry of plant constituents and methods of screening for active constituents, physico-chemical properties of different classes as volatile oils, carbohydrates, flavonoids alkaloids phenols hydrocarbons , resins, and tannins. and the skills in extraction, separation, chemical structures, identification, quantitative determination, medicinal uses and structure activity relationship of phyto-constituents.

III. Course Objectives:

1. To introduce students to the basic principles and concepts of phytochemistry.
2. To acquire an idea about the name of the active constituents, detection of them, uses and toxic

- effects of any.
3. To know the different methods for identification of the main active constituents of the medicinal plants
 4. To understand the main uses of the different groups of the active constituents and their side effects and toxicity.

I. 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. Discuss principles and applications of phytochemistry in synthesis, isolation, purification and identification of plant active constituents.
- a2. Understand principles of qualitative and quantitative analysis of plant active constituents including, volatile oils, carbohydrates, flavonoids alkaloids phenols hydrocarbons , resins, and tannins.
- a3. List the main uses of the active constituents, biotransformation, dosage, contraindications, adverse drug reactions, and drug interactions of natural products.

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.	a1	Discuss principles and applications of phytochemistry in synthesis, isolation, purification and identification of plant active constituents.
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	a2	Understand principles of qualitative and quantitative analysis of plant active constituents including, volatile oils, carbohydrates, flavonoids alkaloids phenols hydrocarbons , resins, and tannins.

A4	Define basic principles of drug: target identification, design, informatics, and mechanisms of action	a3	List the main uses of the active constituents, biotransformation, dosage, contraindications, adverse drug reactions, and drug interactions of natural products.
A5	Outline principles of clinical pharmacology, therapeutics and Pharmacovigilance.		

Intellectual Skills :

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

b1. **Design** appropriate methods for isolation, synthesis, purification, identification and standardization of various chemical constituents of plant, such as volatile oils, carbohydrates, flavonoids alkaloids phenols hydrocarbons , resins, and tannins found in different natural compound classes.

b2. **Select** the suitable methods of analysis and quality control of drugs as raw material, in dosage forms and in biological fluids.

b3. **Differentiation** between the uses, toxicity and safety of constituents of natural drugs.

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	b3	Differentiation between the uses, toxicity and safety of constituents of natural drugs.
B2	Design risk reduction strategies to ensure patient safety and prevent medication errors, drug interaction, and adverse drug effects,	b1	Design appropriate methods for isolation, synthesis, purification, identification and standardization of various chemical constituents of plant, such as volatile oils, carbohydrates, flavonoids alkaloids phenols hydrocarbons , resins, and tannins found in different natural compound classes.
B3	Solve problems to reduce drug therapy problems	b2	Select the suitable methods of analysis and quality control of drugs as raw material, in dosage forms and in biological fluids.
B4	Select drug therapy regimen using mathematical, genomic, clinical pharmacokinetic and pharmacodynamics principles for optimizing the patient therapy and medication safety		

Professional and Practical Skills

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

- c1. **Utilize** the appropriate methods for extraction, isolation, synthesis, purification, identification and standardization of active constituents from different origins.
- c2. **Raise** public awareness on rational use of drugs and social health hazards of abused and misused drugs of natural origin.
- c3. **Manage** adverse effects and toxicity related to constituents of natural origins.

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	Utilize the appropriate methods for extraction, isolation, synthesis, purification, identification and standardization of active constituents from different origins.
C2	Operate different pharmaceutical equipment and instruments		
C3	Extract active substances from different sources.		
C4	Carry outpatient physical assessment.		Raise public awareness on rational use of drugs and social health hazards of abused and misused drugs of natural origin.
C5	Advise the patients and health care professionals for optimizing medicines use.	c2	
		c3	Manage adverse effects and toxicity related to constituents of natural origins.

Transferable (General) Skills :

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

- d1. **Use** information systems and computer softwares in order to develop knowing how to retrieve information related to phytochemistry from a variety of sources.
- D2. **Work** effectively as a part of a team to perform the required tasks related to phytochemistry

Transferable (General) Skills PILOs	Transferable (General) Skills CILOs
After completing this program, students	After completing this course, students would be

would be able to:		able to:	
D1	Communicate effectively and ethically with patients, public, and health care professionals.	d1	Use information systems and computer softwares in order to develop knowing how to retrieve information related to phytochemistry from a variety of sources..
D2	Use information systems and computer softwares in order to enhance the delivery of pharmaceutical care,		
D3	Work effectively individually and in a team	d2	Work effectively as a part of a team to perform the required tasks related to phytochemistry
D4	Have the skills of decision-making and time management and lifelong learning		

IV. 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 Discuss principles and applications of phytochemistry in synthesis, isolation, purification and identification of plant active constituents.	<ul style="list-style-type: none"> Lectures Discussion Sessions Assignments 	<ul style="list-style-type: none"> Periodic exam (Quizzes) Evaluate assignments Mid & final exam
a2 Understand principles of qualitative and quantitative analysis of plant active constituents including, volatile oils, carbohydrates, flavonoids alkaloids phenols hydrocarbons , resins, and tannins.		
a3 List the main uses of the active constituents, biotransformation, dosage, contraindications, adverse drug reactions, and drug interactions of natural products.		

(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 isolation, synthesis, purification, identification and standardization of various chemical constituents of plant, such as volatile oils, carbohydrates, flavonoids alkaloids phenols hydrocarbons , resins, and tannins found in different natural compound classes.	<ul style="list-style-type: none"> • Discussion Sessions • Problem solving • Group discussion • Assignments 	<ul style="list-style-type: none"> • Oral presentations • Evaluate assignments • Mid & final exam
b2	Select the suitable methods of analysis and quality control of drugs as raw material, in dosage forms and in biological fluids.		
b3	Differentiation between the uses, toxicity and safety of constituents of natural drugs.		

(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	Utilize the appropriate methods for extraction, isolation, synthesis, purification, identification and standardization of active constituents from different origins.	<ul style="list-style-type: none"> • Discussion sessions • Assignments 	<ul style="list-style-type: none"> • Oral presentations • Theory & Practical exams • LAB report • Evaluate assignments
c2	Raise public awareness on rational use of drugs and social health hazards of abused and misused drugs of natural origin.		
c3	c3. Manage adverse effects and toxicity related to constituents of natural origins.		

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
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d1	Use information systems and computer softwares in order to develop knowing how to retrieve information related to phytochemistry from a variety of sources.	<ul style="list-style-type: none"> • Discussion Sessions • Assignments that require collecting information from the internet. 	<ul style="list-style-type: none"> • Oral presentations • Writing
d2	Work effectively as a part of a team to perform the required tasks related to phytochemistry		

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CIOs)
1	Introduction to phytochemistry	<ul style="list-style-type: none"> - Methods extraction , isolation identification - Chromatography <ul style="list-style-type: none"> o Paper chromatography o Thin layer chromatography 	1w	2	a1; a2; b1; b2; c1; d1
2	Hydrocarbons	<ul style="list-style-type: none"> - Chemical structure - Groups and subgroups - Biosynthesis - Example (s) 	1w	2	a1; a2; a3; b1; b2; b3; c1;c2; d1
3	Phenols	<ul style="list-style-type: none"> - Chemical structure - Groups and subgroups - Biosynthesis - Chemical and physical properties - Example (s) 	1w	2	a1; a2; a3; b1; b2; b3; c1;c2; d1
4	Tannins	<ul style="list-style-type: none"> - Chemical structure – - Biosynthesis - Chemical and physical properties - Example (s) 	1w	2	a1; a2; a3; b1; b2; b3; c1;c2; d1
5	Coumarins	<ul style="list-style-type: none"> - Chemical structure - Groups and subgroups and - Biosynthesis - Chemical and physical properties - Example (s) 	1w	2	a1; a2; a3; b1; b2; b3; d1
6	Flavonoids	<ul style="list-style-type: none"> - Chemical structure - Groups and subgroups - Biosynthesis - Chemical and physical properties 	1w	2	a1; a2; a3; b1; b2; b3; c1;c2; d1

		- Example (s)			
7	Volatile oils;	- Chemical structure - Biosynthesis - Chemical and physical properties - Example (s)	1w	2	a1; a2; a3; b1; b2; b3; d1
8	Alkaloids	- Diterpenes, Triterpenes & Cardiac glycosides o Chemical structure o Biosynthesis o Chemical and physical properties	1w	2	a1; a2; a3; b1; b2; b3; c1;c2; d1
		- Tropan, Purin and Amino o Chemical structure, o Biosynthesis o Chemical and physical properties o Example (s)	1w	2	a1; a2; a3; b1; b2; b3; c1;c2; d1
		- Quinoline o Chemical structure, o Biosynthesis o Chemical and physical properties o Example (s)	1w	2	a1; a2; a3; b1; b2; b3; c1;c2; d1
		- Henanthrene o Chemical structure, o Biosynthesis o Chemical o Physical properties o Example (s)	1w	2	a1; a2; a3; b1; b2; b3; c1;c2; d1
		- Indole o Chemical structure, o Biosynthesis o Chemical o Physical properties o Example (s)	1w	2	a1; a2; a3; b1; b2; b3; c1;c2; d1
9	Saponins	- Chemical structure - Groups and subgroups - Biosynthesis - Chemical and physical properties - Example (s)	1w	2	a1; a2; a3; b1; b2; b3; c1;c2; d1
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 ○ Preparation of permanent slides	1	1	c1; c2
2	- Introduction to ○ Column chromatography ○ Planner chromatography	1	1	c1; c2
3	- Isolation of different dyes using paper chromatography	1	1	c1; c2
4	- Separation of coloured materials by Column Chromatography.	1	1	c1; c2
5	- Two Dimensional TLC Chromatgraphy ○ The Separation of Ink Pigm	1	1	c1; c2
6	- Tannin identification	1	1	c1; c2
7	- Flavonoid identification	1	1	c1; c2
8	Anthraquinin identification	1	1	c1; c2
9	Coumarin identification	1	1	c1; c2
10	- Volatile oil - containing peroxide	1	1	c1; c2
11	- Volatile oil -ontaining oxide	1	1	c1; c2
12	- Assay of bitter almond oil by Hydroxylamine method	1	1	c1; c2
13	- Assay of volatile oil by	1	1	c1; c2

	bisulfate method			
14	- Alkaloids chemistry o Quinine identification	1	1	c1; c2
Number of Weeks /and Units Per Semester		14	14	

VI. Teaching strategies of the course:

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

V. Assignments:

No	Assignments	Mark	Week Due	Aligned CILOs(symbols)
1	Participation	2.5	Weekly	a1; a2; a3; b3; c3; d1
2	Quizzes	2.5	Weekly	a1; a2; a3; b1; b2; c3
3	Research	2.5	6 th W	a2; a3; b3; c1; c2; d1; d2
4	Assignments	2.5	6 th W	a1; a2; a3; b1; b3; c1; d1
5	Mid – Exam (theoretical)	10	7 th W	a1; a2; a3; b3; c3
	Final Exam (practical)	30	15 th W	a2; b1; b2; c1; c2
	Total score	50%		

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

No.	Assessment Method	Week Due	Mark	Proportion of Final	Aligned Course
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				Assessment	Learning Outcomes
1	Assignments & Homework, Tasks & Presentation	Fortnightly	5	5%	a1; a2; a3; b1; b3; c1; d1
2	Quizzes	W6	2.5	2.5%	a1; a2; a3; b1; b2; c3
3	Mid-Term exam	W8	10	10%	a1; a2; a3; b3; c3
4	Practical reports	W12	2.5	2.5%	a2; b1; b2; c1; c2; d1
5	Final exam practical	W 15	30	30%	a2; b1; b2; c1; c2
6	Final Exam theory	W16	50	50%	a1; a2; a3; b3; c3
Total			100	100%	

VI. Learning Resources:	
1- Required Textbook(s) (maximum two).	
	<ol style="list-style-type: none"> 1. Text book of Pharmacognosy and Phytochemistry. Biren Shah. Elsevier, India. 2nd Edition (2013) 2. Pharmacognosy and Phytochemistry. 2end edition Bruneton Jean, Springer verlag, 2008,
2- Essential References.	
	<ol style="list-style-type: none"> 1. Natural product chemistry. A Mechanistic Biosynthetic and Ecological Approach. 2nd ed., by kur Torsell, 1997. 2. Pharmacognosy, Phytochemistry & Medicinal Plants (by Jean Bruneton) 3rd ed 2008
3- Electronic Materials and Web Sites etc.	
	<p>http://www.bestnetcraft.com/spicy_recipes.pdf -http://www.herbdatanz.com/index.htm - http://www.who.int/medicines/library/trm/medicinalplants.pdf http://www.herb.com/ www.herbalgram.com</p>