Course Specification

I. Course Identification and General Information:

١	**Course Title:**	**Human Physiology I**				
٢	**Course Code &Number:**	*PH1122115*				
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 1*				
٥	**Pre –requisite (if any):**					
٦	**Co –requisite (if any):**					
٨	**Program (s) in which the course is offered:**	**Bachelor of Pharmacy**				
٩	**Language of teaching the course:**	**English**				
١٠	**Location of teaching the course:**	**Thamar university, 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	Explain the fundamentals of general sciences and the basic and biomedical sciences and their relations to pharmacy profession.	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	Define basic principles of drug: target identification, design, informatics, and mechanisms of action	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	Classify the synthetic and natural drugs according to their mechanism of action, systemic effect, therapeutic uses, contraindication and toxicity	b1. Interpret the most important physiological laboratory results (blood, neuromuscular), to distinguish a physiological from a pathological condition.
B2	Design risk reduction strategies to ensure patient safety and prevent medication errors, drug interaction, and adverse drug effects	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. support the theory and help students to comprehend the general physiologic principles of the performance of the human body
C2	Operate different pharmaceutical equipment and instruments	c2. Performing hematological tests
C1	Handle the chemical, biological, and pharmaceutical materials safely	c3. Present physiological scientific data in a graphical from

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	
D2	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 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. - Seminar	- Quiz - Attendance - Seminars
a4. Describe the fundamental of the nervous system and muscle system		

(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.	- Lecture - Discussion groups - Brain storming	- 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 Skillsto 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 - Home work
c2. Calculate erythrocytes sedimentation rate and hemoglobin count		
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	- 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.		

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Introduction to human physiology	- role of physiology in clinical medicine, - Physiology definition, differentiation of body systems functions - How Is the Body Organized - General Principles of Physiology	1	2	a1
2	Homeostasis and body fluids	- 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	- 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	- 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	- 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	**M**uscle	- 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	
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	b1 c1,c2,c3 d1,d2
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.

VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Class attendance	a1,a2,a3,a4,b1,b2,c1,d1,d2	Weekly	5
2	Seminars and quiz	a1,a2,a3,a4,b1,b2,c1,d1,d2	Weekly	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	Quiz	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. Jayp 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 Histology

I. Course Identification and General Information:

1	**Course Title:**	Histology				
2	**Course Code &Number:**	PH1122116				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		1		3
4	**Study level/ semester at which this course is offered:**	2nd Year 1st semester				
5	**Pre –requisite (if any):**	General Biology				
6	**Co –requisite (if any):**					
7	**Program (s) in which the course is offered:**	**Bachelor of Pharmacy**				
8	**Language of teaching the course:**	**English**				
9	**Location of teaching the course:**					
10	**Prepared By:**	**Dr. Abdulrahman Al-Haifi**				
11	**Date of Approval**	**2021**				

II. Course Description:

This course presents the basics of histology.

III. Course Objectives:

The course aims to provide the students with the required knowledge of histology and provide some practical skills regarding microscopy and analysis of tissues.

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 cerebrumand 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 , digestive , endocrine , urinary , male & female genital , eye & ear	- Lectures and Groups discussion. - Practical	- Quizzes, Written exam.
a2. Describe various levels of sections in the		

spinal cord & brain stem	presentations - Self - learning	
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 cerebrumand 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	- Discussions and - Training - Field visits - Problem solving	- 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 Skillsto Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Answer questions on various parts of the curriculum	- Discussions and - Training - Field visits - Problem solving	- 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	- Group discussions - Cooperative learning. - Self – learning - Inductive and deductive	- Homework - Evaluates of Oral Presentation

VII. Course Content:.

A. Theoretical Aspect:

Order	Topic List	Sub Topics List	No of Week	contact hours	ILOS
1	**Basic histology**	• 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**	• 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**	• 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, 7- testis, 8-ovary, 9-pituitary gland and thyroid gland, 10- spinal cord.	4	8	**a1, a2, b1, b2, d1**

9	**Exams**	Mid-term exam Final exam	2	4	
Number of Weeks /and Units Per Semester			**16**	**32**	

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: • Definition, techniques. • Decalcification solution.	1	**2**	**c1-c3**
4	Tissue processing: • 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.	Tr.	
		2		2		3
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:**	Bachelor of Pharmacy				
8	**Language of teaching the course:**	English				
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. Objectives

To provide the student with the required knowledge in physical pharmacy

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	- Lectures and presentation. - Self – learning	- Quizzes, written exam.

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

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
b1	Apply relevant equations to calculate physical measurements related to formulation and stability of pharmaceutical preparations	- Lectures, Discussions - Brain Storming	- Achievement tests (Written Tests) - Oral Tests

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

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
c1	Handle efficiently and safely the chemical materials and tools used in the laboratory.	- Lectures, presentation - Practical training - Cooperative &. S elf – learning	- Lab Reports' Evaluation - Practical exam
c2	Operate the instruments and measure physical properties successfully in the laboratory.		

(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.	- Group discussions - Self – learning - Cooperative learning	- 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**	- **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**	- Melting point - Micrometrics o Particle size, particle shape o Arrangement of particles: Crystals, amorphous, polymorphism, solvate (hydrates) o Crystallization : principles and applications o Tapped and bulk density and porosity o Flowability : Carr`s index & angle of repose - Surface Energy & wettability.	3	6	a1, b1
3	**liquid states physical properties**	- **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**	- **Bulk Interactions** o Dissolution; solubility , miscibility; o Dispersion , Solubilization, & Critical micelles concentration;	4	8	a1, b1

		types and roles of surfactants; factors reducing surfactant activity , HLB o Partition coefficient : Hydrophilicity and lipophilicity and role of pH **- Surface interactions** o Adsorption o Complexation **- Transfer of matter:** Diffusion **- Incompatibility**			
5	**Stability and Degradation**	- **Concept of stability** o Definition and types of degradation o Definition and types of stability o Causes of degradation o Stabilizers and other approaches to reduce degradation - **Kinetics of stability** o Order of degradation (zero, first, second) : equations, rate constants, half-life o Stability determination: accelerated, long-term, shelf life (t_{90})	3	6	a1, b1
6	**Exams**	- **Mid-Term Exam** - **Final Exam**	2	4	
Number of Weeks /and Units Per Semester			16	32	

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	Aligned Course

				Assessment	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 works — Attitude	1-12	5	**5%**	**c1, c2,d1,d2**,d3
5	Lab. Term works — Accomplishments	1-12	5	**5%**	**c1, c2,d1,d2**,d3
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*.

Course Specification First Aid

I. Course Identification and General Information:

1	**Course Title:**	First Aid				
2	**Course Code &Number:**	PH1122181				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		1		1		2
4	**Study level/ semester at which this course is offered:**	**2nd Level/1st Semester**				
5	**Pre –requisite (if any):**					
6	**Co –requisite (if any):**					
7	**Program (s) in which the course is offered:**	**Bachelor of Pharmacy**				
8	**Language of teaching the course:**	**English**				
9	**Location of teaching the course:**	**Faculty of Medical Sciences, Thamar University**				
10	**Prepared By:**	**Dr. Hamood Almoshky**				
11	**Date of Approval**					

II. Course Description:

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

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

III. Course Objectives:

This course aims to provide students with:

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

IV. Course Intended Learning Outcomes (CILOs):

Knowledge and Understanding:

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

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

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

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

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

Knowledge and Understanding PILOs	Knowledge and Understanding CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
A1	a1

Intellectual Skills :

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

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

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

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

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

Intellectual Skills PILOs	Intellectual Skills CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
B1	b1

Professional and Practical Skills

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

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

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

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

Professional and Practical Skills PILOs	Professional and Practical Skills CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
C1	c1

Transferable (General) Skills :

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

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

d1- Manage time effectively

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

Transferable (General) Skills PILOs	Transferable (General) Skills CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
D1	d1

V. Alignment Course Intended Learning Outcomes

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

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

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

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

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Apply the principals and guidelines for the treatment of shock, bleeding, burns, and fractures; methods of resuscitation; and methods of moving injured persons.	- Solving of some clinical cases. - Presentations - Practical course	- Oral presentations - LAB report - Midterm exams - Practical exam - Semester activities
c2. Assess drug interaction, drug –food interaction and proper indication of drugs		

during first aid treatment		

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Manage time effectively d2- Provide good advice about balanced diet to promote the efficiency of medication and give hand in poisoning cases	- Discussion Sessions - Assignments that require collecting information from the internet	- Oral presentations - Semester activities

V. Course Content:

A. Theoretical Aspect:

Order	Topics List	Sub-topics List	No of Weeks	Contact Hours	ILOS
1	**Definition of first aids** **The aim of first aids**	• Definition of first aids • The aim of first aids	**1**	1	a1- a3, b1, b2
2	**Hemorrhage and wounds.**	• External bleeding. • Internal bleeding.	**1**	1	a1-a3, b2, b3
3	**Shock** .	• Definition, types. • First aid treatments	**1**	1	a2, a3, b2, b3
4	**Unconsciousness:**	• Definition, • first aid and treatment	**1**	1	a2, a3, b2, b2
5	**Epileptic fits:**	• Definition, • first aid and treatment	**1**	1	a2, a3, b1, b2
6	**Splits and bandage:** .	• Aims of bandage in first aid. • Aims of splinting in first aid. • Methods of apply bandages	**2**	2	a2, a3, b2, b3, d1
	Mid-Term	Mid-Term Exam	**1**	1	

7	**Fracture and dislocation:**	• Definition, types, signs, and symptoms, the first aid and treatments. • Definition of dislocation, the first aid treatments.	**1**	1	a2, a3,b2, b3
8	**Burns and scalds:**	• Heat burns and chemical scalds. • First aid and treatments	**1**	1	a2, a3, b2, b3, d1, d2
9	**Management of laboratory accidents:**	• Infections, burns, cults, harmful fumes inhalation, • chemical and explosions • injuries, and electric shocks	**2**	2	a2, a3, b2, b3, d1
10	**Asphyxia and C.R.P.**	• Artificial respiration	**1**	1	a1- a3, b2, b3, d1, d2
11	**Poisoning and Vital signs**	• Poisoning • Vital signs	**2**	2	a2, a3, b2, b3, d2
	Final	Final-Exam	**1**	1	
Number of Weeks /and Units Per Semester			**16**	**16**	

B. Practical Aspect:

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

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

VI. Teaching strategies of the course:

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

VII. Assignments:

No	Assignments	Mark	Week Due	Aligned CILOs(symbols)
1	Participation	2.5	Weekly	
2	Quizzes	2.5	Weekly	
3	Research	2.5	6th W	
4	Assignments	2.5	6th W	
5	Mid – Exam (theoretical)	10	7th W	
	practical	20	15th W	
	Total score	**40%**		

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments & Homework, Tasks & Presentation	Fortnightly	7.5	7.5%	a1; a2; a3; b1; b2;c1;c2; d2
2	Quizzes	W6	2.5	2.5%	a1; a2; a3; b1; b2;c1
3	Mid-Term exam	W8	10	10%	a1; a2; a3; b1; b2; c1
4	Practical reports and Med Pract. Exam	W12	10	10%	a1; b3; c2d2
5	Final exam practical	W 15	20	20%	a1; a3; b1; b3;c1;
6	Final Exam theory	W16	50	50%	a1; a2; a3; b1; b2;c1
Total			**100**	**100%**	

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

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

1. Bailey & Love. short practice of surgery Latest edition.
2. Terry, N. Current surgical diagnosis and treatment, Latest edition.
3. Browse, L; An introduction to symptoms and signs of surgical disease, Latest edition.

2- Essential References.

3- Electronic Materials and Web Sites *etc.*

Course Specification of Pharmaceutical Analytical Chemistry 1

I. Course Identification and General Information:

١	**Course Title:**	**Pharmaceutical Analytical Chemistry 1**				
٢	**Course Code &Number:**	**PH1122133**				
٣	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		1		3
٤	**Study level/ semester at which this course is offered:**	**2nd level 1st** *semester*				
٥	**Pre –requisite:**	**General Chemistry I**				
٦	**Co –requisite:**	**No**				
٨	**Program (s) in which the course is offered:**	**Pharmacy**				
٩	**Language of teaching the course:**	**English**				
١٠	**Location of teaching the course:**	**Faculty of Medical Sciences – Thamar University**				
11	**Prepared By:**	**Dr. Sam Dawbaa & Dr. Olla Sharhan**				
12	**Date of Approval**	**2023-2024**				

II. Course Description:

This course is devoted to the exploration of principles of qualitative and quantitative analysis, analysis of anions and cations, aqueous and non-aqueous methods of titration, methods of expression of concentrations, principles of volumetric analysis, acid-base equilibria in aqueous and non-aqueous solutions, acid-base titrations, and their pharmaceutical applications.

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

1. Aims of The Course:

The overall aims of the course are:

- To provide students with the fundamentals of acid-base titrations and precipitation titrations, and complexometric analysis.
- To illustrate the indicators, solvents and reagents used in various methods of analysis.
- To describe the advantages and disadvantages of each analytical method.
- To illustrate the methods of determination of the concentration and pH and their pharmaceutical applications.
- To solve some problems that are related to concentrations, pH, acid-base titrations, buffer solutions, redox reactions, and precipitation titrations.
- To cover the applications of these methods in the pharmaceutical industry.

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

A. Knowledge And Understanding:

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

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

		al	Describe qualitative and quantitative analysis, know the fundamentals of acid-base and precipitation titrations as well as the gravimetric analysis.
		a2	Recognize the different analytical methods for analysis of certain substances according to physico-chemical properties of the chemical compounds.

(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 qualitative and quantitative analysis, know the fundamentals of acid-base and precipitation titrations as well as the gravimetric analysis.	• Lectures • Discussion Sessions • Assignments	• Periodic exam (Quizzes) • Home Assignments • Exams
a2- Recognize the different analytical methods for analysis of certain substances according to physico-chemical properties of the chemical compounds		

B. Cognitive/Intellectual Skills

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

Program Intended Learning Outcomes (Sub- PILOs)		**Course Intended Learning Outcomes (CILOs)**	
		b1	-Evaluate and interpret the possible interactions or interferences of some chemical compounds with the selected method of analysis of certain compounds depending on the studied principles.
		b2	-Design and determine suitable methods of analysis of drugs as raw materials.
		b3	-Interpret the difference between salt, acid and buffer and Use data of acid-base reactions to calculate concentrations of unknown sample.

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- evaluate and interpret the possible interactions or interferences of some chemical compounds with the selected method of analysis of certain compounds depending on the studied principles.	• Discussion Sessions • Problem solving • Group Discussion	• Oral presentations • Home assignments
b2- Design and determine suitable methods of analysis of drugs as raw materials. **b3-** Interpret the difference between salt, acid and buffer and Use data of acid-base reactions to calculate concentrations of unknown sample**.**		

C. **Practical/Professional Skills**

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

Program Intended Learning Outcomes (Sub-PILOs)		**Course Intended Learning Outcomes (CILOs)**	
C1		**c1**	-Prepare standard solutions to be used for quantitative analysis of different unknown samples and calculate

		c2 c3	concentrations of different acids or basses as well as, pH values of different solutions. -Employ different quantitative chemical methods for assay of raw materials -Usage of different techniques for separation of mixture

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- 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.	• Discussion Sessions • Assignments	• Oral presentations • Exams • Lab report • Technical/Practical
c2- Employ different quantitative chemical methods for assay of raw materials.		
c3- Usage of different techniques for separation of mixture.		

D. **General And Key Transferable Skills**

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

Program Intended Learning Outcomes (Sub-PILOs)		**Course Intended Learning Outcomes (CILOs)**	
		d1	Apply the information technology skills, such as MS Word and Excel processing, internet communication, and online searches.
		d2	Manage the time in an analytical work effectively.

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Apply the information technology skills, such as Word and Excel processing, internet communication, and online searches.	# Discussion Sessions # Assignments #Tutorial	-Oral -presentations
d2- manage the time in an analytical work effectively.		

IV. Course Content:

A. Theoretical Aspect:

	Topic List	Number of Weeks	Contact Hours	ILOs
1	Introduction; qualitative and quantitative analysis, measurement units, role of analytical chemistry in pharmacy and medicine	1	2	a1, b1, b2, d1
2	Method of expression of concentrations (part1) Molecular & equivalent weight, Molarity, Normality, Formality, Molality, etc.	2	4	a2, d1, d2
3	Method of expression of concentrations (part2): weight percent calculations e x: weight, volume, w/w%, w/v%, v/v%, ppm, strength of solution, analysis, determination, and measurement; classifying analytical techniques, selecting an analytical method etc.	2	4	a2, d1, d2
4	Neutralization reactions, Ionic product of water, pH concept, calculations of pH for acids and bases, buffer solutions, etc.	2	4	a1
5	Midterm exam	1	2	
6	Solutions, acid-base indicators, buffer solutions, calculations of pH for buffer solutions, chemical equilibrium, effect of electrolytes on chemical equilibrium	2	4	a1
7	Non-aqueous titrations, theory, advantages and limitation, non-aqueous solvents, ionization and dissociation in nonaqueous media, titration of weak acids and bases, indicators in non-aqueous titration, preparation of standard solutions, and their applications in the assay of some pharmaceutical compounds.	1	2	a1, b2, d2
8	Principles of Neutralization titration. Titration curves and determination of the equivalent point. Titration curves of different neutralization reactions and application problems.	3	6	a1, b2, d2
9	Principles of volumetric analysis. primary standards, types of reactions used in volumetric analysis	1	2	a1, b2, d2
10	Final Exam	1	2	
	Total	16	32	

B. Practical Aspect: (if any)				
Order	**Topics List (Tasks/ Experiments)**	**Number of Weeks**	**Contact Hours**	**ILOs**
1	Introduction to volumetric analysis The rules of safety and fluency in laboratory work.	**1**	**2**	**c2**
2	Handling of accurate measures Use of the analytical balances and glassware in the titrations. Preparation of some solution.	**1**	**2**	**c1**
3	Titration of strong acid with strong base, HCl with NaOH	**1**	**2**	**c2**
4	Determination of HCl/acetic acid mixture against standard NaOH.	**1**	**2**	**c2**
5	Determination of NaOH/Na_2CO_3 mixture	**1**	**2**	**c2**
6	Determination of ammonium chloride by back titration	**1**	**2**	**c2**
7	Determination of vitamin C by titration with standard iodine solution, or analysis of commercial hydrogen peroxide solution by Iodometric titration.	**1**	**2**	**c2**
8	Determination of aspirin by back titration	**1**	**2**	**c2**
9	Determination of benzoic acid in soda drink.	**1**	**2**	**c2**
10	Determination of the total hardness of water by EDTA titration.	**1**	**2**	**c2**
11	Determination of pH of two solutions	**1**	**2**	**c2**
12	Determination of NaCl by Mohr method	**1**	**2**	**C2**
13	Final exam	**1**	**2**	**c1, c2 , c3**
Number of Weeks /and Units Per Semester		**12**	**24**	

V. Teaching strategies of the course:
• Lectures
• Search topic and discussion sessions
• Lab Class
• Media Presentations: Power Point, Video
• Assignments

VI. *Assignments:*

no	Assessment Tasks	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs(symbols)
1	**Participation, quizzes**	Each week	5	5%	a1, a2, b1, c1, d2
2	**assignments**	6th week	5	5%	a1, a2, b2, c2, d2
3	**Mid – Exam (theoretical)**	7th week	10	10%	a1, a2, a3, b1, b2, d2
4	**Mid – Exam (practical)**	6th week	١٠	10%	c1, c2, c3
5	**Final Exam (practical)**	13th week	20	20%	a1, a2, b1, b2, d2
6	**Final Exam (theoretical)**	16th week	50	50%	a1, a2, b1, b2, d2
	Total		100	100%	

VII. Learning Resources:

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

1. Skoog, West, Holler & Crouch- 2021, Fundamentals of Analytical Chemistry -10th Edition, Cengage.
2. David G. Watson – 2016, Pharmaceutical Analysis_ A Textbook for Pharmacy Students and Pharmaceutical Chemists, Elsevier.

2. Recommended Readings and Reference Materials.

- David Harvey – 2000, Modern Analytical Chemistry, McGrawHill.
- Analytical chemistry: principles and techniques By Larry G. Hargis. (editors) (December 17, 1996), publisher: Pearson Education POD; Facsimile edition ISBN:013033507X
- 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
- Fifield, F. W. (2000). *Principles and practice of analytical chemistry* by blackie academic and professional (4th edition)
- Whitten, K.w,. Davis, R.E.& Peck, M.L. (2000). General chemistry with qualitative analysis by saunders college publishing (6th edition).
- Robert, J. F., Eva, C., Hans, H. M., Robin, W. (2020), Fundamentals of Analytical Toxicology: Clinical and Forensic, 2nd Edition, Wiley & Sons, Inc. mit Sitz in Hoboken, New Jersey, USA

3. Essential References.

	1. Analytical Chemistry bu Gary D. Christian publisher: Wiley; 6edition (March7,2003) ISBN:0471214728 2. Analytical chemistry (an introduction) by Skoog/West/Holler (edition)6th (1994), Saunders Golden SunBurst series, ISBN:0-03-097285. 3. Quantitative analysis by R.A-Day, JR, A.L-UNDERWOOD (editors) 6thedition (1991), prentice-Hall, ISBN:0-13-747361-3. 4. Quantitative analysis chemistry by James S. FRITZ, GOERG H. SCHENK (editors) 5th edition (1987), prentice-Hall, Englewood Clifts, ISBN:0-205-10480-0.
4. Electronic Materials and Web Sites etc.	
	- Analytical letters - Journal pharmaceutical and biomedical analysis - Analytical chemistry - www.sciencedirect.com
5. Other Learning Material.	
	- Laboratory instruments and equipment's are needed - Data show projector

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

Course Specification of Pharmacognosy I

I. Course Identification and General Information:

١	**Course Title:**	**Pharmacognosy I**				
٢	**Course Code &Number:**	*PH1122142*				
٣	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		1		3
٤	**Study level/ semester at which this course is offered:**	**2nd level 1st** *semester*				
٥	**Pre –requisite:**	Biology, Chemistry				
٦	**Co –requisite:**	**No**				
٨	**Program (s) in which the course is offered:**	**Bachelor of Pharmacy**				
٩	**Language of teaching the course:**	**English**				
١٠	**Location of teaching the course:**	**Faculty of Medical Sciences – Thamar University**				
11	**Prepared By:**					
12	**Date of Approval**	**2022**				

I. Course Description:

This course provides student with an overview of the concept of Pharmacognosy. It is concerned with the study of drugs from natural products, the methods of cultivation, collection and drying of these drugs. The course focuses on medicinal drugs from leaves, flowers and barks with their active constituents, medicinal uses for treating diseases and also the skills to identify, and assess a crude drug for treating disease and predict their toxicity, contraindications, as well as, any health hazards concerning their misuse and abuse and interactions if any.

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

1. Aims of The Course:

The overall aims of the course are:

1. *To provide the students with the knowledge of the basic concepts of Pharmacognosy and the correlate of medicinal actions of medicinal plants with their content of secondary metabolites*
2. *To Train the students for medicinal plants cultivation, collection, processing and storage of crude drugs.*
3. *To provide pharmacy students with different medicinal herbal drugs including certain medicinal plant leaves, herbs, bark and wood and their active constituents.*
4. *To enable the students to illustrate with details the morphological and histological characters of medicinal plants, and uses for treatment of different diseases*
5. *To Provide the students with knowledge and skills concerning authentication and/or quality assurance of medicinal plants when present either in entire or powdered forms*
6. *To familiarize the students with herbs currently in use in the market.*

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

A. Knowledge And Understanding:

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

Program Intended Learning Outcomes	*Course Intended Learning Outcomes (CILOs)*

(Sub- PILOs)			
A1 *A3*		*a1* *a2* *a3* *a4* *a5*	: Explain different methods of cultivation, collection, curing, drying, adulteration and storage of medicinal plants. Classify herbal drugs according to botanical origin, chemical constituents, and medicinal activity. : Enumerate the different types of plant cells, secretory structures, different classes of secondary metabolites and their chemical identification. : Identify microscopically the structure of the medicinal plant leaves, barks and wood in both their entire and powdered forms.. *: Describe the therapeutic applications of medicinal plants.*

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1- Explain different methods of cultivation, collection, curing, drying, adulteration and storage of medicinal plants.	• Lectures • Discussion Sessions • Assignments	• Periodic exam (Quizzes) • Home Assignments • Exams
a2- Classify herbal drugs according to botanical origin, chemical constituents, and medicinal activity.		
a3- Enumerate the different types of plant cells, secretory structures, different classes of secondary metabolites and their chemical identification.		
a4- Identify microscopically the structure of the medicinal plant leaves, barks and wood in both their entire and powdered forms..		
a5- Describe the therapeutic applications of medicinal plants		

B. Cognitive/Intellectual Skills

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

Program Intended Learning Outcomes (Sub- PILOs)		***Course Intended Learning Outcomes (CILOs)***	
B5		*b1* *b2* *b3* *b4*	: Identify unknown medicinal plant leaves, herbs, and barks morphologically, and outline the main differences between different plant parts; roots, stems, leaves, etc. : Identify the active constituents of the medicinal plants, and predict actions & medicinal uses of any plant based on its content of secondary metabolites. : Design suitable natural drug formulations whether in entire, powdered forms according to pharmacopoeial criteria : Evaluate the purity of the medicinal drug as well as detection of its adulteration.

(B) Alignment Course Intended Learning Outcomes ofIntellectual Skillsto Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies

b1- Identify unknown medicinal plant leaves, herbs, and barks morphologically, and outline the main differences between different plant parts; roots, stems, leaves, etc.	• Discussion Sessions • Problem solving • Group Discussion	• Oral presentations • Home assignments
b2- Identify the active constituents of the medicinal plants, and predict actions & medicinal uses of any plant based on its content of secondary metabolites		
b3- Design suitable natural drug formulations whether in entire, powdered forms according to pharmacopoeial criteria		
b4- Evaluate the purity of the medicinal drug as well as detection of its adulteration.		

C. ***Practical/Professional Skills*** • ***After successful completion the course, students will be able to:***			
Program Intended Learning Outcomes (Sub- PILOs)		***Course Intended Learning Outcomes (CILOs)***	
C2		*c1*	:Design the practical skills of microscopically examining and identifying different crude drugs in sections and powdered forms
		c2	: Carry out experiments for detection different active constituents, different plant secondary metabolites and for detection of adulteration.
		c3	: Use proper and safe dispensing, storage and disposal of pharmaceutical preparations
		c4	:Apply the acquired scientific knowledge to write full schemes and monographs for other drugs under investigation..

©Alignment Course Intended Learning Outcomes of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1- Design the practical skills of microscopically examining and identifying different crude drugs in sections and powdered forms	• Discussion Sessions • Assignments	• Oral presentations • Exams • LAB report
c2- Carry out experiments for detection different active constituents, different plant secondary metabolites and for detection of adulteration.		
c3- Use proper and safe dispensing, storage and disposal of pharmaceutical preparations		
c4- Apply the acquired scientific knowledge to write full schemes and monographs for other drugs under investigation		

D. *General And Key Transferable Skills* • *After successful completion the course, students will be able to:*			
Program Intended Learning Outcomes (Sub- PILOs)		***Course Intended Learning Outcomes (CILOs)***	
D1 *D3*		*d1* *d2* *d3*	:Conduct online computer search to develop information technology skills in order to retrieve information from a variety of sources. :Work effectively as a part of a team and independently to perform the required tasks : Demonstrate good written and oral communication skills.

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Conduct online computer search to develop information technology skills in order to retrieve information from a variety of sources.	• *iscussion Sessions* • *ssignments that require collecting information from the internet.*	• *ral presentations* • *riting*
d2- Work effectively as a part of a team and independently to perform the required tasks		
d3- Demonstrate good written and oral communication skills		

III. Course Content:

A. Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Week	contact hours	ILOs
1	**Introduction**	Definition , wild and cultivated plants, propagation , environmental conditions and classifications, Collection, drying, storage, package, Plant chemistry, cell contents, food storage and secondary metabolites.	3	6	a1, a2,a3,b1,b2,c2,d1
2	**Medicinal leaf**	Types , botanical description ,anatomical structure	2	2	A3, a4, b1,b2,b6,d1
3	**Digitalis ,uva-ursi, buchuleaf**	Botanical origin , collection, active constituents , medicinal uses , allied drug, adulteration	1	2	A1, b5, d2
4	**Jaborandi, henna ,hammamiles and senna**	Botanical origin , collection, active constituents , medicinal uses , allied drug, adulteration	1	2	a1, a2, b4,d2
5	**Ephedra , menthe ,eucalyptus and belladonna**	Botanical origin , collection, active constituents , medicinal uses , allied drug, adulteration	1	2	a2,a3, b2,b3,d3
6	**Mid-Term**	Mid-Term Exam	1	2	
7	**Medicinal flower**	Types of flowers , types of inflorescence and anatomy	2	4	a3,4,a5, b1,b4,d2
8	**Clove ,**	Botanical origin , collection,	1	2	a1,a2, b1, b4, d1

	santonica ,chamomile flowers	active constituents , medicinal uses , allied drug, adulteration			
9	**Matricaria , passiflora , melfolium**	Botanical origin , collection, active constituents , medicinal uses , allied drug, adulteration	1	2	a1,a2, b4, d1
10	**Passion ,German and Roman chamomile**	Botanical origin , collection, active constituents , medicinal uses , allied drug, adulteration	1	2	a1,a3 , b2, b3, d3
11	**Pyretherium ,saffron**	Botanical origin , collection, active constituents , medicinal uses , allied drug, adulteration	1	2	a1,a3 , b2, b3, d3
12	**Final**	Final-Exam	1	2	
Number of Weeks /and Units Per Semester			**16**	**32**	

B. Practical Aspect: (if any)

Order	**Tasks/ Experiments**	**Number of Weeks**	**contact hours**	**ILOs**
1	Introduction	1	**2**	c1
2	Microscopical examination of cell contents: starch grains, calcium oxalate & carbonate crystals and phloem fibres. &stomatas	1	**2**	c2
3	Morphology of plant parts indicated in theory.	1	**2**	c2
4	Microscopic examination of stem monocot and dicot plants.	**1**	**2**	c2,3,4
5	Microscopic examination of root monocot and dicot plants.	**1**	**2**	c2,3,4
6	Microscopic examination of leaf monocot and dicot plants.	**1**	**2**	c2,3,4
7	Mid- term Exam	**1**	**2**	
8	Morphological characteristic of plant family Solanaceae	**1**	**2**	c1, c2, c4
9	Quantitative microscopy Leaf constants	**1**	**2**	c1, c2, c4
10	Quantitative microscopy Dimention measurement	**1**	**2**	c1, c2, c4
11	Final – Exam	**1**	**2**	
Number of Weeks /and Units Per Semester		**11**	**22**	

IV. Teaching strategies of the course:

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

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

VI. *Learning Resources:*

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

1. *Trease,CE and Evans,WC. Textbook of Pharmacognosy.11th to 14th Editions. Tindal L. U.K.*
2. *Tyler,VC Brady, LR and Robers JE.Pharmacognosy.8th Edition, Lea &Febeger, Phildelphia.*

2. Recommended Readings and Reference Materials.

1. *Atal,CK and Kappor,BM.Cultivation and Utilisation of Medicianl Plants.*
2. *Wallis,TE. Textbook of Pharmacognosy,5thEdition,J&A,ChurchillLimited,U.K.*
3. *Kokate,CKPurohit,AP. And Gokhale,SB.Pharmacognosy*

3. Essential References.

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

4. Electronic Materials and Web Sites etc.

1. http://www.botanical.com
2. Antamedica
3. Lytochemistry

5. Other Learning Material.

1. Laboratory instruments and equipments are needed
2. Data show projector

VII. *Course Policies:*

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

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

Course Specification of Pharmaceutical Organic Chemistry 2

I. Course Identification and General Information:

١	**Course Title:**	**Pharmaceutical Organic Chemistry 2**				
٢	**Course Code &Number:**	**PH1122132**				
٣	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		1		3
٤	**Study level/ semester at which this course is offered:**	**2nd level 1st** *semester*				
٥	**Pre –requisite:**	**Pharmaceutical Organic Chemistry 1**				
٦	**Co –requisite:**	**No**				
٨	**Program (s) in which the course is offered:**	**Pharmacy**				
٩	**Language of teaching the course:**	**English**				
١٠	**Location of teaching the course:**	**Faculty of Medical Sciences – Thamar University**				
11	**Prepared By:**	**Dr. Olla Sharhan**				
12	**Date of Approval**	**2023-2024**				

II. Course Description:

This course will cover the different organic functional groups carried by organic compounds and drugs, Aromatic compounds, Alcohol, Carbonyl, Aldehydes, Ketones and Carboxylic compounds focusing on the nomenclature, biological rule and of these functional groups of these compounds. The topics will include the physical and chemi properties, chemical reactions, methods of preparation and mechanisms including pharmaceutical compound.

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

1. Aims of The Course:

The overall aims of the course are:

1. To describe the nomenclature, physical and chemical properties of organic compounds
2. To illustrate the different method of preparations.
3. To provide students with proper understanding of the basic principles of organic reactions.
4. To provide a level education, establishing a broad knowledge base and experience in organic chemistry and its life applications
5. To provide students with reactions and mechanisms of aromatic compounds

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

A. Knowledge And Understanding:

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

	Program Intended Learning Outcomes (Sub- PILOs)		Course Intended Learning Outcomes (CILOs)
A1 A2 A3		a1 a2	-Define the concept of aromaticity and the chemistry of different classes of aromatic compound and their application. -Enumerate the theories of identification, synthesis, and purification of different amines,

		a3	carboxylic acid derivatives. -Recognize the basic principles of pharmaceutical organic chemistry especially; aromatic, Alkyl, aryl, halides, alcohol, carbonyl, aldehydes, ketones and carboxylic compounds

(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 concept of aromaticity and the chemistry of different classes of aromatic compound and their application	• Lectures • Discussion Sessions • Assignments	• Periodic exam (Quizzes) • Home Assignments • Exams
a2- Enumerate the theories of identification, synthesis, and purification of different amines, carboxylic acid derivatives.		
a3- Recognize the basic principles of pharmaceutical organic chemistry especially; aromatic compounds, alcohol, carbonyl, aldehydes, ketones and carboxylic compounds.		

B. Cognitive/Intellectual Skills • **After successful completion the course, students will be able to**			
Program Intended Learning Outcomes (Sub- PILOs)		**Course Intended Learning Outcomes (CILOs)**	
B2 B5		b1 b2 b3	- Design synthetic plans for biologically active compounds. - Select and justify appropriate methods of identification and purification of synthetic aromatic compounds. -Identify critically about the chemistry of aromatic organic compounds and relate their specific structural features to possible synthesis, identification, and physicochemical properties

(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 synthetic plans for biologically active compounds.	• Discussion Sessions • Problem solving • Group Discussion	• Oral presentations • Home assignments
b2- Select and justify appropriate methods of identification and purification of synthetic aromatic compounds		
b3- Identify critically about the chemistry of aromatic organic compounds and relate their specific structural features to possible synthesis, identification, and physicochemical properties		

C. **Practical/Professional Skills** • **After successful completion the course, students will be able to:**			
Program Intended Learning Outcomes (Sub- PILOs)		**Course Intended Learning Outcomes (CILOs)**	
C1 C4		**c1** **c2** **c3**	-Perform safety Handling measures for chemicals in the lab and be aware of the rules of good laboratory practice (GLP). -Identify different functional groups of organic compounds and to diagnose elements in organic compounds and determine their functional groups. -apply professional skills in synthesis and preparation of different pharmaceutical organic compounds.

©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 safety Handling measures for chemicals in the lab. and be aware of the rules of good laboratory practice (GLP)	• Discussion Sessions • Assignments • tutorial	• Oral presentations • Exams • Lab report
c2- Identify different functional groups of organic compounds and to diagnose elements in organic compounds and determine their functional groups.		
c3- apply professional skills in synthesis and preparation of different pharmaceutical organic compounds.		

D. **General And Key Transferable Skills** • **After successful completion the course, students will be able to:**			
Program Intended Learning Outcomes (Sub-PILOs)		**Course Intended Learning Outcomes (CILOs)**	
D1 D4		d1 d2	- apply information technology skills; including word processing, database use, archiving data and information retrieval on different area of chemistry through online computer searches and internet communication. - Work effectively in a team and to give seminar to small group of students.

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

d1-apply information technology skills; including word processing, database use, archiving data and information retrieval on different area of chemistry through online computer searches and internet communication	-Discussion Sessions -Assignments that require collecting information from the internet.	-Oral presentations -Writing
d2- Work effectively in a team and to give seminar to small group of students		

IV. Course Content:

A. Theoretical Aspect:

	Topic List	Number of Weeks	Contact Hours	ILOs
1-2	- Aromatic Compounds: Definition, structure, properties, nomenclature. - The concept of Aromaticity - Resonance Model for Benzene - General methods of synthesis and chemical reactions. -Ring-Activating and Ring Deactivating - Ortho, Para-Directing and Meta-Directing Groups - Meta-Directing Groups -Substituent Effects on Reactivity -The Importance of Directing Effects in Synthesis. - Therapeutical application	3	6	a1, a3, b2, b3
3	-Alcohols, Phenols & Thiols: Nomenclature, Classification, Physical Properties, Preparation of Alcohols, Reactions of Alcohols. -Therapeutical application	2	4	a3, d1
4	-Ethers & Epoxides: Nomenclature, Physical Properties, Preparation of Ethers & Epoxides, Reactions of Ethers & Epoxides. -Therapeutical application	1	2	a3, b1, d1
5	-Carbonyl Compounds, Aldehydes and Ketones (aliphatic and aromatic): Nomenclature, Physical Properties, Aldehydes and Ketones Preparation, Reactions of Ketones and Aldehydes. -Therapeutical application	1	2	a3, b1, d1
6	Carboxylic Acids & Nitriles: Nomenclature, Physical Properties, Preparation, Reactions of Carboxylic Acids & Nitriles - Importance of nitro compounds	1	2	a2, a3, d1
7	Med-term Exam	1	2	
8	Carboxylic Acid Derivatives: Nomenclature of acid chlorides, anhydrides, esters, amides, and nitriles; Lactones and lactams; Nucleophilic acyl substitution; Interconversion of acids, acid chlorides, anhydrides, amides and nitriles; Reduction of acid	2	4	a2, a3, d2

	derivatives.			
9	Carbonyl α-Substitution Reactions, Carbonyl Condensation Reactions, Aldol Reactions, Claisen Reactions, Michael Reactions	1	2	a2, a3, d1, d2
10	Amines: Structure, nomenclature, and properties of amines; Amine salts; Basicity of amines; Preparation from nitro compounds, azides, and amides; Reductive amination; Aromatic substitution reactions of aromatic amines; *N*-Alkylation, acylation, and sulfonylation reactions; Hofmann elimination; Nitrosation (diazotization) of amines; Substitution reactions of arenediazonium salts; Diazonium coupling.	3	6	a2, a3, b1, d1, d2
11	Characterizations of molecules using spectroscopic techniques (IR, MS and NMR)	2	4	a1, a2, b1, d1, d2
	Total	16	32	

B. Practical Aspect: (if any)

Order	Topics List (Tasks/ Experiments)	Number of Weeks	Contact Hours	ILOs
1	Introduction to laboratory and safety hazards	**1**	**2**	**c1**
2	Identification of Alcohols Detection of hydroxyl groups	**1**	**2**	**c2**
3	Identification of aldehyde and ketones	**1**	**2**	**c2**
4	Preparation of aspirin, Iodoform, Nitrophenol, 3-nitrophthalic acid, 2,4-Dinitrochlorobenzene.	**1**	**2**	**c2, c3**
5	Synthesis of ethyl acetate	**1**	**2**	**c2, c3**
6	Preparation of acetamide	**1**	**2**	**c2, c3**
8	Preparation of acetanilide	**1**	**2**	**c2, c3**
9	Preparation of *O*-chlorobenzoic acid from *O*-chlorotolune Preparation of cyclohexanone from cyclohexanol	**1**	**2**	**c2, c3**
10	Preparation of benzoic acid oxidation of benzyl alcohol	**1**	**2**	**c2**
11	Preparation of soap	**1**	**2**	**c2**
12	**Review**	**1**	**2**	**c2, c3**
Number of Weeks /and Units Per Semester		**12**	**24**	

V. Teaching strategies of the course:
• Lectures
• Search topic and discussion sessions
• Lab Class
• Media Presentations: Power Point, Video
• Assignments

I. Assignments:

no	Assessment Tasks	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs(symbols)
1	**Participation, quizzes**	Each week	5	5%	a1, a2, b1, c1, d2
2	**Assignments**	6th week	5	5%	a1, a2, b2, c2, d2
3	**Mid – Exam (theoretical)**	7th week	10	10%	a1, a2, a3, b1, b2, d2
4	**Mid – Exam (practical)**	6th week	١٠	10%	c1, c2
5	**Final Exam (practical)**	13th week	20	20%	a1.a2, b1, b2, d2
6	**Final Exam (theoretical)**	16th week	50	50%	a1.a2, b1, b2, d2
	Total		100	100%	

II. Learning Resources**:**

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

- Graham Solomons, T. W. (2008). *Organic Chemistry*. 9th ed., John Wiley and Sons, Inc., New York.
- Furniss, H., Smith, T. V. (1989). *Textbook of Practical Organic Chemistry*. 5th ed., Longman Group UK Ltd, England.
- Sykes, A.P. A. (2009). *Guide Book to Mechanism in Organic Chemistry*. 6 th Ed., Lonsmen Co. London, UK.
- David R. K. (2015). *Organic Chemistry*. John Wiley & Sons Inc., New York.
- Liu, X. (2021). *Organic Chemistry I*. Kwantlen Polytechnic University.
- Dalal, M. (2019). *A Textbook of Organic Chemistry*–Volume 1. Dalal Institute.
- Klein, D. R. (2020). *Organic chemistry*. John Wiley & Sons.

2. Recommended Readings and Reference Materials.

- European journal of medicinal chemistry.
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3. Essential References.

	1. Organic chemistry: A short course by Harold Hart, Leslie E. Craine, David J. Hart, publisher: Houghton Miffin college; 10th edition (January 1999) ISBN: 0395902258. 2. Organic Chemistry: A Short Course. By Harold Hart, Leslie E. Craine, David J. Hart. Publisher: Houghton Mifflin College: 10th edition (January 1999) ISBM: 0395302258 3. Introduction to Organic Chemistry (Study guide & Solutions Manual).by Andrew 4. Organic Chemistry. by: T.W. Graham Solomons, 8thedition, 2003. 5. Janice Gorzynski Smith." Organic Chemistry", 2011, Third Edition, McGraw-Hill, a business unit of The McGraw-Hill Companies, New York
4. Electronic Materials and Web Sites etc.	
	- Journal of organic chemistry, biomed.net
5. Other Learning Material.	
	- Laboratory instruments and equipment's are needed - Data show projector

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

Course Specification: Human Physiology II

I. Course Identification and General Information:

1	**Course Title:**	**Human Physiology II**					
2	**Course Code &Number:**	PH1122217					
3	**Credit hours:**	C.H				TOTAL	
		Th.	Seminar	Pr	Tr.		
		2		2		3	
4	**Study level/ semester at which this course is offered:**	*Level 2, semester 2*					
5	**Pre –requisite (if any):**	Anatomy1, histology1, biochemistry1					
6	**Co –requisite (if any):**	Anatomy,2, histology,2, biochemistry,2					
8	**Program (s) in which the course is offered:**	**Pharmacy**					
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:

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. Describe the normal functions of the all human systems.	
a2. Suggest the basic physiological measurements used to test different body functions	
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. Analyze different mechanisms for regulation of all body systems.	
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. Comprehend the general physiologic principles of the performance of the human body.	
c2. Perform a systematic examination of all the human systems	
c3. Present physiological scientific data in a graphical from	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 normal functions of the all human systems.	- Interactive lectures. - Video.	- Quiz - Attendance
a2. Suggest the basic physiological measurements used to test different body functions	- Interactive lectures. - Video. - Seminars.	- Quiz - Attendance - Seminars
a3. Introduce the concept of internal environment and homeostasis.	- Interactive lectures. - Video. - Seminar	- 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.	- 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 Skillsto 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. 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	-	
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	**Cardiovascular system**	- 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
2	**Autonomic nervous system.**	- Autonomic nervous system divisions - Functions of autonomic nervous system	2	4	a1,a2.
3	**Respiratory system**	- 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 - Some important definitions in respiration	3	6	a1,a2
4	**Urinary system**	- 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	3	6	a3

		tubule segment. - Plasma clearance and measure of GFR. - Diuresis and diuretics. - Artificial kidneys - Factors influencing urine formation.			
5	**Endocrine system**	- 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
6	**Gastrointestinal system**	- Physiology of GIT functions of Month, salivary glands, pharynx, Small intestine. - Digestion and absorption of Nutrients, carbohydrate, proteins AND lipids - large intestine and rectum, defecation reflex - Liver and pancreas - importence of bile - Functions of pancreatic - Enzymes and its roles In digestion	2	4	a1,a2,a3
	Med exam	-	1	2	
	Final exam	-	1	2x3`	
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**	**b1 c1,c2,c3 d1,d2**
2	Determination of Breath Holding Time	**1**	**2hr/ group**	

	(BHT			
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 Cardiac Efficiency Tests (Exercise Tolerance Tests) Demonstration of Carotid Sinus Reflex Demonstration of Venous Blood Flow Recording of Venous Pressure Electrocardiography (ECG) Experiments on Student Physiography	**6**	**12hr/ group**	
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			

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	Continuous	5	5%	a1- a4
2	Attendance	Continuous	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 Physiology. Jayp 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 of Pharmaceutical Microbiology I

I. Course Identification and General Information:

1	**Course Title:**	**Pharmaceutical Microbiology I**				
2	**Course Code &Number:**	PH1122223				
3	**Credit hours: 3**	C.H				Total
		Th.	Seminar	Pr.	Tr.	
		2		1		3
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 Pharmacy**				
8	**Language of teaching the course:**	**English**				
9	**Location of teaching the course:**	**Thamar University – Faculty of Medical Sciences**				
10	**Prepared By:**	**Dr. Abdulrahman Al-Haifi**				
11	**Date of Approval**	**2021**				

II. Course Description:

This course 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.
4. 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

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.	- Lectures - Discussion Sessions	- 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.	- Discussion Sessions - Problem solving - Group discussion	- 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 Skillsto 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	- Practical discussion	- 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 bacteria. - Specimen collections and transportations Media	2	4	a1, a2, b2, b3, c1, c2

4	**Pathogenic organisms**	- 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	- 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	- 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 Instrumentations	2	4	a1, c1, c2
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	6th W	
4	Assignments	2.5	6th W	
5	Mid – Exam (theoretical)	20	7th W	
	Final Exam (practical)	30	15th 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:**	PH1122271				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		1		3
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:**	pharmacy				
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. - Practical presentations - Self - learning	- Quizzes, Written exam
a2	Explicit the general properties, the types and roles of excipients, advantages and disadvantages of pharmaceutical liquid dosage forms		

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

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
b1	Classify pharmaceutical 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. - Self – learning - Inductive and deductive	- Homework - Evaluates of Oral Presentation
d2	Participate efficiently with colleagues in a team work		

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	**Introduction To pharmaceutics**	Definitions and brief history of pharmaceutics, 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**	- Roles, types with examples 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**	- **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**	- Definition; disadvantages of Galenicals, lozenges, cachets, pills, etc.	1	2	a1, a2, b1, b2, d1
5	**Introduction to Non-sterile Pharmaceutical solutions**	- 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**	- 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**	- 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**	• **Introduction** Definition, types: coarse dispersion, fine dispersion; compare disperse system and true solution ; compare colloids, suspensions, emulsions; general advantages and problems of disperse systems • **Coarse dispersions** ➢ **Suspensions** o Definition, types, advantages , disadvantages, ideal properties o Formulation: (flocculated, deflocculated) , excipients (suspending agents, flocculating agents; others) o Steps of preparation o Instability Problems : sedimentation; cake formation; evaluation and approaches to reduce o Packaging ➢ **Emulsions** o Definition, types, advantages,	3	6	a1, a2, b1, b2, d1, d2

		disadvantages ○ 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 • **Fine dispersions** Definition, types, advantages, disadvantages, principles and method of preparations ➢ **Colloidal suspensions Microemulsions and nanoemulsion**			
Number of Weeks /and Units Per Semester			14	28	

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	contact hours	Aligned Couse Intended Learning Outcomes CILOs
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. Term	Attitude	1-10	5	**5%**	**c1, c2,d1,d2**
5		Accomplishments		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*.

Biochemistry 1 Course Specification: Biochemistry 1

Faculty: Faculty of Medical Sciences

Program: Laboratory Medicine

I. Course Identification and General Information:

1	**Course Title:**	**Biochemistry 1**				
2	**Course Code &Number:**	*PH1122218*				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		1		3
4	**Study level/ semester at which this course is offered:**	*2nd level/ 2nd semester*				
5	**Pre –requisite (if any):**					
6	**Co –requisite (if any):**					
8	**Program (s) in which the course is offered:**	**Bachelor of Pharmacy**				
9	**Language of teaching the course:**	**English**				
10	**Location of teaching the course:**	**Faculty of Medical Sciences, Thamar University**				
11	**Prepared By:**	**Dr. Abdulqawi Al-Shammakh**				
12	**Date of Approval**					

II. Course Description:

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

III. Course Intended Learning Outcomes (CILOs) :

Knowledge and Understanding:

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

Knowledge and Understanding PILOs	Knowledge and Understanding CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
A1	a1- Demonstrate knowledge and understanding on the molecular composition of the cells and subcellular components.
A1	a2- Explain the basic concept of acid, base and buffer and their role in maintaining the pH in human body.
A1	a3- Describe chemistry of biomolecules (amino acid, protein, carbohydrate, lipid, nucleic acid and vitamin) their classifications, nomenclature, and biological functions.
A2	a4- Demonstrate knowledge and understanding on the

	principal and theory of the various tests he or she is performing in the clinical laboratory.

Intellectual Skills:	
Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)	
Intellectual Skills PILOs	**Intellectual Skills CILOs**
After completing this program, students would be able to:	After completing this course, students would be able to:
B1	b1- Integrate the knowledge of biochemistry with other biomedical sciences.
B1	b2- Compare and contrast the structural differences between carbohydrates, amino acids, protein and nucleic acids.
B2	b3- Interpret the result of biochemical test used to detect carbohydrates protein and lipids.
B3	b4- Create a safety checklist that identifies key elements of the following categories of hazards: biohazard, fire, chemical, electrical.

Professional and Practical Skills	
Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)	
Professional and Practical Skills PILOs	**Professional and Practical Skills CILOs**
After completing this program, students would be able to:	After completing this course, students would be able to:
C4	c1- Perform various procedures for the qualitative measure of carbohydrates proteins and lipids.
C4	c2- Prepare and label buffer solutions and used pH meter to measure the value of pH.
C4	c3- Estimate total protein, albumin blood sugar and lipids
C1	c4- Perform and monitor quality control and biosafety within predetermined limits.

Transferable (General) Skills :	
Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)	
Transferable (General) Skills PILOs	**Transferable (General) Skills CILOs**
After completing this program, students would be able to:	After completing this course, students would be able to:
D7	d1-Develop awareness of the role and responsibilities of the medical laboratory technician as a member of the health care team.
D5	d2- Respect the faculty staff and friends and co-operate with others
D3	d3- Use scientific website to solve and prepare your assignment.
D2	d4- Demonstrating professional conduct and interpersonal communication skills with patients, laboratory personnel, other health care professionals.

IV.	I. Intended learning outcomes (ILOs) of the course: After completion of this course, the student should be able to:		
	(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes		**Teaching strategies**	**Assessment Strategies**
a1	Demonstrate knowledge and understanding on the molecular composition of the cells and subcellular components.	Active Lectures (supported with discussions)	Written exam, Quiz,
a2	Explain the basic concept of acid, base and buffer and their role in maintaining the pH in human body.	Active Lectures (supported with discussions)	Written exam, Quiz, homework
a3	Describe chemistry of biomolecules (amino acid, protein, carbohydrate, lipid, nucleic acid and vitamin) their classifications, nomenclature, and biological functions. and the important reactions of carbohydrates.	Active Lectures, Tutorial, electronic self-learning	Written exam Problem's evaluation Quizzes, assignment
a4	Demonstrate knowledge and understanding on the principal and theory of the various tests he or she is performing in the clinical laboratory.	Active Lectures (supported with discussions), Tutorial	Written exam Problem's evaluation Quizzes, assignment
	(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
b1	Integrate the knowledge of biochemistry with other biomedical sciences.	Problem solving , tutorial, group discussion	Assignment, oral exam, MCQ and written exam
b2	Compare and contrast the structural differences between carbohydrates, amino acids, protein and nucleic acids	Lecture, tutorial, electronic learning	Assignment, and written exam
b3	Interpret the result of biochemical test used to detect carbohydrates protein and lipids	Laboratory practices, brainstorm, case study	Laboratory report Case report, quiz
b4	Create a safety checklist that identifies key elements of the following categories of hazards: biohazard, fire, chemical, electrical.	Laboratory practices, lecture and discussion	Practical exam, laboratory report, Quiz and written exam
	(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes		**Teaching strategies**	**Assessment Strategies**
c1	Perform various procedures for the qualitative measure of carbohydrates proteins and lipids.	**Laboratory practice, laboratory demonstration**	**Laboratory attendance, Laboratory report, practical exam**

c2	Prepare and label buffer solutions and used pH meter to measure the value of pH.	**Laboratory practice, laboratory demonstration**	**Laboratory attendance, Laboratory report, practical exam**
c3	Estimate total protein, albumin blood sugar and lipids	**Laboratory practice, laboratory demonstration**	**Laboratory attendance, Laboratory report, practical exam**
c4	Perform and monitor quality control and biosafety within predetermined limits.	**Laboratory practice,**	**Practical performance assessment, quality control reports, Practical exam**
	(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes		**Teaching strategies**	**Assessment Strategies**
d1	Develop awareness of the role and responsibilities of the medical laboratory technician as a member of the health care team.	**Laboratory practice**	**Laboratory attendance, practical exam,**
d2	Respect the faculty staff and friends and Co-operate with others	**Lecture, workshop participation, Seminar, group discussion**	**Classes and lab attendance, evolutionary report , assignment and presentation**
d3	Use scientific website to solve and prepare your assignment.	**Assignments, case study, electronic learning**	**Assignment report, presentation**
d4	Demonstrating professional conduct and interpersonal communication skills with patients, laboratory personnel, other health care professionals.	**Group discussion, presentation**	**Oral exam, seminar**

V- Course Content:

A – Theoretical Aspect:

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

		-pH definition, acid and base, weak acids and their biological importance. -Buffer definition and strength, Biological buffer in human body			
3	Carbohydrates	Definition and Functions of carbohydrates, classification of carbohydrates, Monosaccharide structural aspects, classification, biological importance and chemical reaction Derivatives of monosaccharides. Disaccharide, oligosaccharide and polysaccharide, structure and function	a3,a4, b2, b3, d2, d3	2	4
4	Amino acids	Structure Classification, essential and non-essential, biological importance, chemical reaction and properties, non-proteinogenic amino acids	a3,a4,b2,b3,d2,d3	1	2
	Midterm exam		a1-a4, b1,b2,b3,d2,d3	1	2
5	Peptide and Proteins	Peptide bonds formation , classification biologically important peptides, protein classification, levels of protein structures, plasma proteins their role and function, clinical	a3,a4,b2,b3	2	4

		significance of plasma proteins			
6	Lipids	chemistry of fatty acids and lipids, their biological functions, and their classifications	a1,a3,a4,b2,b3	2	4
7	Nucleic acids	Chemistry Nucleosides, nucleotides, structure of nucleic acids and their biological functions. DNA replication and protein synthesis	a3,a4, b2,d2,d3	2	4
8	Vitamins	chemical structure, different classes of vitamins, dialyrequirements and their relation to some diseases.	a3,a4,a,b2,d2,d3	2	4
	Final exam		a1-a4 ,b1, b2,b4,d2,d3	1	2
Number of Weeks /and 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	**Introduction to laboratory and biosafety in the lab**	**1**	**2**	**c4, d1**
2	**Analysis of carbohydrates Molish test, Fehling's test, Benedict's test, Barfoed's test, Seliwanoff's test**	**2**	**4**	**c1, c2, b3,b4,d1,d4**
3	**Color reactions of proteins: Biuret Reaction, Ninhydrin Reaction, Modified Millon's Reaction, Sakaguchi Test for Guanidine Group.**	**2**	**4**	**c1, b3,b4, d1,d4**

	Precipitation test for proteins			
4	**Midterm exam**	**1**	**2**	**c1,c2,c4,b3,b4, d1,d4**
4	**Colormetric assay for determination of total protein, albumin, glucose lipid and lipoproteins**	**4**	**8**	**c3,c4,b3,b4,d1, d4**
5	**Field visit**	**2**	**4**	
	Final exam	**1**	**2**	**Midterm c1,c2,c4,b3,b4 Final exam c1,c2,c4,b3,b4, d1,d4**
Number of Weeks /and Units Per Semester		**13**	**26**	

VI- Teaching strategies of the course:

The teaching strategies of the course will include the following methods
Active Lectures (supported with discussions), Tutorial, Problem solving, group discussion, electronic learning, practical session, and field visit

VII- Assignments:

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

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

8	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
	Seminar		2	2%	d4,d3
	Presentation and assignment		3	3%	d2,d4,d5
1	oral		5	5%	b1,d2,d4
2	Midterm practical exam		10	10%	c1,c2,c4,b3,b4
3	Mid-Term Theoretical Exam		10	10%	a1-a4, b1,b2,b3
4	Logbook(Practical report)		10	10 %	d2,d1, b3
5	Final Practical Exam		20	20 %	c1,c2,c4,b3,b4, d1
6	Final theoretical exam		40	40%	a1-a4,b1, b2,b4
7	Total		100	100 %	

IX- Learning Resources:

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

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

1- D M Vasudevan, (2019),Text book of Biochemistry for Medical Student, 9th edition Jaype Publishers, India.
2- Lieberman and Marks's,(2017) Marks' Basic Medical Biochemistry: A Clinical Approach, 5th edition, USA, Wolters Kluwer Health.
3- Satyanarayana U, (2019),Biochemistry,5th edition, Generic Publisher. India

2- Essential References.

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

3- Electronic Materials and Web Sites *etc.*

1- https://blog.feedspot.com/biochemistry_blogs/
2- http://www.csun.edu/~hcchm001/biosites.htm
3- http://www.gwu.edu/~mpb/glycolysis3d.htm
4- https://blog.feedspot.com/biochemistry_blogs/

X- Course Policies:

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

Course Specification of Pharmaceutical Analytical Chemistry II

I. Course Identification and General Information:

١	**Course Title:**	**Pharmaceutical Analytical Chemistry 2**					
٢	**Course Code &Number:**	PH1122235					
٣	**Credit hours:**	C.H				TOTAL	
		Th.	Seminar	Pr	Tr.		
		2		1		3	
٤	**Study level/ semester at which this course is offered:**	**2nd level 2nd** *semester*					
٥	**Pre –requisite:**	**Pharmaceutical Analytical Chemistry I**					
٦	**Co –requisite:**	**No**					
٨	**Program (s) in which the course is offered:**	**Pharmacy**					
٩	**Language of teaching the course:**	**English**					
١٠	**Location of teaching the course:**	**Faculty of Medical Sciences – Thamar University**					
11	**Prepared By:**	**Dr. Olla Sharhan & Dr. Sam Dawbaa**					
12	**Date of Approval**	**2023-2024**					

II. Course Description:

This course is devoted to the exploration of principles of qualitative and quantitative analysis, methods expressing of the oxidation-reduction titrations, gravimetric, precipitation, potentiometric method, complexometric titrations with their applications to enhance students' abilities and provide a comprehensive and sound understanding and knowledge of these topics.

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

1. Aims of The Course:

- To provide students with the fundamentals of oxidation-reduction titrations, gravimetric, precipitation, potentiometric method, complexometric titrations and statistical evaluation of the results, and explaining their application in the pharmaceutical analysis of drug substances
- To list the advantage and disadvantages of different method of analysis
- To identify the concentration and yield of the pharmaceutical compounds
- To teach the students how to select the suitable method for analysis of drug substances and interpret the results.

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

A. Knowledge And Understanding:

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

Program Intended Learning Outcomes (Sub- PILOs)		**Course Intended Learning Outcomes (CILOs)**	
A5		**a1**	- Mention the fundamentals of oxidation-reduction, gravimetric, precipitation, potentiometric method, and complexometric titrations, as well as understand the basic statistical parameters.
		a2	- Mention the suitable method for analysis of drug substances depending on basic.

(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- Mention the fundamentals of oxidation-reduction, gravimetric, precipitation, potentiometric method, and complexometric titrations, as well as understand the basic statistical parameters	• Lectures • Discussion Sessions • Assignments	• Periodic exam (Quizzes) • Home Assignments • Exams
a2- Mention the suitable method for analysis of drug substances depending on basic		

B. Cognitive/Intellectual Skills

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

Program Intended Learning Outcomes (Sub- PILOs)		**Course Intended Learning Outcomes (CILOs)**	
B1 B2		**bl** **b2** **b3**	-Assess and interpret the possible interactions or interferences of some compounds. - Selected method of analysis of certain compounds depending on the studied principles. -Design appropriate methods for evaluation and standardization of various chemical and pharmaceutical 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- Assess and interpret the possible interactions or interferences of some compounds	• Discussion Sessions • Problem solving • Group Discussion	• Oral presentations • Home assignments
b2- Selected method of analysis of certain compounds depending on the studied principles.		
b3- Design appropriate methods for evaluation and standardization of various chemical and pharmaceutical compounds		

C. **Practical/Professional Skills**

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

Program Intended Learning Outcomes (Sub-PILOs)		**Course Intended Learning Outcomes (CILOs)**	
C1 C2		**c2** c2 c3	- Handle properly the chemical compounds in the laboratory -Apply the rules of good laboratory and storage practice to minimize the errors of an applied analytical method -Employ different quantitative chemical methods for assay of raw mater.

D. 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 properly the chemical compounds	• Discussion Sessions	• Oral presentations

in the laboratory	• Assignments	• Exams • Lab report
c2- Apply the rules of good laboratory and storage practice to minimize the errors of an applied analytical method		
c3- Employ different quantitative chemical methods for assay of raw materials.		

E. **General And Key Transferable Skills**

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

Program Intended Learning Outcomes (Sub-PILOs)		**Course Intended Learning Outcomes (CILOs)**	
D3 **D1**		**d1** **d2**	- Work effectively with the others as a team work in performing the report on the results of an analytical method. - Manage the time in an analytical work effectively

(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 with the others as a team work in performing the report on the results of an analytical method.	-Discussion Sessions -Assignments that require collecting information from the internet.	-Oral presentations -Writing
d2- Manage the time in an analytical work effectively		

IV. Course Content:

A. Theoretical Aspect:

Order	Topic List / Units	Week Due	Contact Hours	ILOs
1	Precipitation titration: Theory of precipitation titration, Adsorption indicators. Formation of a precipitate and solubility product: - Problems on solubility product -Mohr's method - Volhard's methods -Fajan's method -Pharmaceutical application	**2**	**4**	**a1, b1**
2-3	Principles of oxidation-reduction reactions. Titration curves and redox indicators and the application. Factors affecting oxidation potential. Detection of the end point in redox titrations. Properties of some oxidizing agents. Oxidation reduction in pharmaceutical analysis. Pharmaceutical applications of redox titrations.	**2**	**4**	**a1,b1**
4	Complexometric titration: Concepts of complexation and chelation, Werner's co-ordination number, stability of complexes, titrants, titration curves. -Types of complexometric titrations, methods of end point detection, metallochromic indicators, metal ion buffer, titration selectivity - masking and demasking.	**2**	**4**	**a1, b1**

	Stability of metal-EDTA Complexes EDTA titration curves. Metal ion indicators (metallochromic indicators), Types of EDTA titrations, EDTA selectivity, Chelation and biological action, Titrations involving unidentate ligands.			
5	Midterm	**1**	**2**	
6	Potentiometry: Theoretical consideration, measurement of potential, instrumentation, Reference and indicator electrodes, ion selective electrodes, potentiometric titrations, location of end point, equipment, analytical application direct measurement of mean concentration, differential curve, determination of solubility product.	**2**	**4**	**a1, b1, d1**
7	Gravimetric Methods of Analysis: Overview of Gravimetry, Why Gravimetry Is Important. - Types of Gravimetric Methods - Theory and Practice	**2**	**4**	**a1**
8	-Volatilization Gravimetry, Theory and Practice, Quantitative Applications, Evaluating Volatilization Gravimetry -Particulate Gravimetry, Theory and Practice, Quantitative Applications. Evaluating Precipitation Gravimeter.	**1**	**2**	**a1, b2, d1, d2**
9	Accuracy, Precision and Q-test Linear regression and correlation. Sampling Validation of analytical procedure, Types of analytical procedure.	**2**	**4**	**a2**
9	Pharmacopeia; analysis of cosmetics; analysis of lipids	**1**	**2**	**a1, a2, d1 b1, b3, d2**
12	Final exam	1	2	
	Number of Weeks /and Units Per Semester	**16**	**32**	

B. Practical Aspect: (if any)

Order	Topics List (Tasks/ Experiments)	Number of Week	Contact Hours	ILOs
1	-Oxidation Reduction Titrations : Préparation and standardization of some redox titrantse.g. potassium permanganate, potassium dichromate, iodine, sodium thiosulphate, etc.	2	**4**	**c1, c3**
2	-Some exercises related to determination of oxidizing and reducing agents in the sample shall be covered. Exercises involving potassium iodate, potassium bromate, iodine solution, titanous chloride, and Sodium 2, 6-dichlorophenol indophenol and ceric ammonium sulphate.	1	**2**	**c1, c3**
3	-Complexometric titrations: Preparation and standardization of EDTA solution, some exercise related to pharmacopoeial assays by Complexometric titrations ; Standardization of $KMnO_4$ by Redox titration.	٢	٤	**c1, c3**
4	- precipitation titration	1	**2**	**c2, c3**
5	-Determination of thiamine as silico tungstate by Gravimetry method -Assay of potassium chloride. Or Assay of sodium chloride.	**2**	**4**	**c3**
6	-Precipitation titration of Standardization of silver nitrate	**1**	**2**	**c3**

7	-Assay of calcium gluconate or lactate injection/tablets by	1	2	c3
8	-Assay of thiamine hydrochloride by non-aqueous titration	1	2	c3
9	-Limit test for chlorides	1	2	c3
Number of Weeks /and Units Per Semester		**13**	**26**	

V. Teaching strategies of the course:

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

VI. ***Assignments:***

no	Assessment Tasks	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs(symbols)
1	**Participation, quizzes**	Each week	5	5%	a1, a2, a3, b1,c1,d3
2	**Assignments**	6th week	5	5%	a1, a3, b3, c3, d2
3	**Mid – Exam (theoretical)**	7th week	10	10%	a1, a2, a3, b1, b2, d2
4	**Mid – Exam (practical)**	6th week	١٠	10%	c1, c2
5	**Final Exam (practical)**	13th week	20	20%	a1.a2, b1, b2, d2
6	**Final Exam (theoretical)**	16th week	50	50%	a1.a2, b1, b2, d2
	Total		100	100%	

VI. Learning Resources:

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

- Analytical chemistry: principles and techniques. [FACSIMILE] publisher: prentice Hall College Div; Facsimile edition (January 1, 1988) ISBN: 013033507X
- Larry G. H. (1996). *Analytical chemistry: principles and techniques*. publisher: Pearson Education POD; Facsimile edition
- Douglas A., Skoog, West, D. M., Holler, F. J., and Stanley, R. C. (2004). *Fundamentals of Analytical Chemistry*, 8th edition, Thomson Brooks/Cole, Belmont, USA

2. Recommended Readings and Reference Materials.

- Fifield, F.W., & Kealey, D. (1995). *principles and practice of analytical chemistry*. blackie academic and professional (4th edition).
- Fifield, F.W., & Kealey, D. (2000). *principles and practice of analytical chemistry*. Kingston University (5th edition). http://anhihs.com/up/Principles%20and%20Practice%20of%20Analytical%20Chemistry%20%20F.W.%20Fifield%202000.compressed.pdf
- Whitten, k. w., Davis, R. E., & Peck, M.L. (2000). *General chemistry with qualitative analysis*. Saunders college publishing (6th edition).

3. Essential References.

- Analytical Chemistry by Gary D. Christian publisher: Wiley; 6edition (March7, 2003) ISBN:047121472
- Analytical chemistry (an introduction) by Skoog/West/Holler (edition)6th (1994), Saunders Golden Sun-Burst series, ISBN:0-03-097285.
- Quantitative analysis by R.A-Day, JR, A.L-UNDERWOOD (editors) 6th edition (1991), prentice-Hall, ISBN:0-13-747361-3.
- Quantitative analysis chemistry by James S. Fritz, Goerg H. Schenk (editors) 5th edition (1987), prentice-Hall, Englewood Clifts, ISBN:0-205-10480-0.

4. Electronic Materials and Web Sites etc.

- Analytical letters
- J. pharmaceutical and biomedical analysis
- Analytical chemistry
- www.sciencedirect.com
- The Analytical Forum on ChemWeb (http://analytical chemweb.com/search/search.exe)

5. Other Learning Material.

1. Lectures
2. Practical
3. Homework and reports

VII. Course Policies:

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

Course Specification of Pharmacognosy II

I. Course Identification and General Information:

١	**Course Title:**	**Pharmacognosy II**				
٢	**Course Code &Number:**	*PH1122243*				
٣	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		1		3
٤	**Study level/ semester at which this course is offered:**	**2nd level 2nd** *semester*				
٥	**Pre –requisite:**	Biology, Chemistry				
٦	**Co –requisite:**	**No**				
٨	**Program (s) in which the course is offered:**	**Bachelor of Pharmacy**				
٩	**Language of teaching the course:**	**English**				
١٠	**Location of teaching the course:**	**Faculty of Medical Sciences – Thamar University**				
11	**Prepared By:**					
12	**Date of Approval**	**2022**				

*I. Course **Description**:*

The course is a continuation of the previous one. It is concerned with providing students with the knowledge related to drugs of plant sources from different organs such as seeds, 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. This course also is concerned with the study of drugs from natural products, the methods of cultivation, collection and drying, morphological and histological characters of different plant organs, their detection, adulteration and identification either entire or in powdered form, their active constituents and uses and any health hazards concerning their misuse and abuse and interactions.

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

1. Aims of The Course:

The overall aims of the course are:

1. *To provide the students with the knowledge and skills related to drugs of plant sources from different organs such as seeds, herbs and fruits, which reputed to be used in folk medicine and have curative values.*
2. *To familiar with the morphological and histological characters of different plant organs, their detection, adulteration and identification either entire or in powdered form.*
3. *To know their active constituents and their adverse action and interactions with other drugs.*

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

A. Knowledge And Understanding:

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

Program Intended Learning Outcomes (Sub- PILOs)		***Course Intended Learning Outcomes (CILOs)***	
A 2 A 5		*a1*	: Acquire knowledge about the pharmaceutical importance of seeds, fruits, subterranean organs and unorganized drugs **:** Describe the macro and microscopically features of different

		a2	medicinal plant parts obtained from seeds, herbs and fruits either in the entire or powdered form.
		a3	: Know the proper medical and pharmaceutical terminology and abbreviation in the relevant context.

(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- Acquire knowledge about the pharmaceutical importance of seeds, fruits, subterranean organs and unorganized drugs	• Lectures • Discussion Sessions • Assignments	• Periodic exam (Quizzes) • Home Assignments • Exams
a2- Describe the macro and microscopically features of different medicinal plant parts obtained from seeds, herbs and fruits either in the entire or powdered form		
a3- Know the proper medical and pharmaceutical terminology and abbreviation in the relevant context		

B. Cognitive/Intellectual Skills

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

Program Intended Learning Outcomes (Sub- PILOs)		***Course Intended Learning Outcomes (CILOs)***	
B2 *B3*		*b1* *b2* b3	:Integrate their knowledge to suggest safe and effective natural medicine for individual patient use. : Identify other drugs outside his main study, predict possible medicinal uses and determine their conformation with pharmacopeial monographs. : Assess drug interaction and adverse drug reactions

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Integrate their knowledge to suggest safe and effective natural medicine for individual patient use.	• Discussion Sessions • Problem solving • Group Discussion	• Oral presentations • Home assignments
b2- Identify other drugs outside his main study, predict possible medicinal uses and determine their conformation with pharmacopeial monographs		
b3- Assess drug interaction and adverse drug reactions		

C. ***Practical/Professional Skills***

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

Program Intended Learning Outcomes (Sub- PILOs)		***Course Intended Learning Outcomes (CILOs)***	
C3 *C4*		*c1* ***c2*** *c3*	:Apply skills concerning drug-herb interaction, herb adverse reaction and toxicity. - Use properly the scientific terms of the studied course :Perform experiments in the lab within proper technical, safety ethical framework.

		c4	: Apply the acquired scientific knowledge to write full schemes and monographs for other drugs under investigation.

©Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1- Apply skills concerning drug-herb interaction, herb adverse reaction and toxicity	• Discussion Sessions • Assignments	• Oral presentations • Exams • LAB report
c2- Use properly the scientific terms of the studied course		
c3- Perform experiments in the lab within proper technical, safety ethical framework		
c4- Apply the acquired scientific knowledge to write full schemes and monographs for other drugs under investigation		

D. ***General And Key Transferable Skills***

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

Program Intended Learning Outcomes (Sub- PILOs)		***Course Intended Learning Outcomes (CILOs)***	
D1 *D5*			d1:Use information technology skills including word processing, information retrieval, through online computer searches. **d2:** Work effectively in team and independently to perform the required tasks. d3: Manage her/his time

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Use information technology skills including word processing, information retrieval, through online computer searches	• *iscussion Sessions* • *ssignments that require collecting information from the internet.*	• *ral presentations* • *riting*
d2- Work effectively in team and independently to perform the required tasks		
d3- Manage her/his time		

III. Course Content:

A. Theoretical Aspect:

Order	Units/Topics List	**Sub Topics List**	**Number of Week**	**Contact hours**	**ILOs**
1	Medicinal fruit	- *Type of fruit , and anatomy* - *Anise , thyme , coriander Star anise, fennel , vanillia*	2	2	a1, a2,3,b1,b2, c1, c4, d2
	Medicinal fruit	- *Botanical origin , collection, active constituents , medicinal uses , allied drug, adulteration*	1	2	a1, a2,3,b1,b2, c1, c4, d2
2	Star anise, fennel , vanillia, Caraway,	Botanical origin , collection, active constituents , medicinal	1	2	a1, a2, b1,b2, c2, d2

	hemlock, visnaga	use			
3	Caraway, hemlock, visnaga	Botanical origin , collection, active constituents , medicinal uses , allied drug, adulteration	1	2	a1, a2, b1, b2, c2, d2
4	Medicinal bark (types of the bark, anatomy) Cascara, frangula , cinchona, acacia, Cinnamon , pomegranate , willow	Botanical origin , collection, active constituents , medicinal uses , allied drug, adulteration	2	4	a1, a2, b2,b3, c2, d1
5	Midterm Exam		1	2	
6	Medicinal roots (types of the bark, anatomy)	Botanical origin, collection, active constituents , medicinal uses , allied drug, adulteration	2	2	a1,a2,b2,b3, c2 b1,b4,d3
7	Belladonna , ipecac, hydrastis, Rauwolfia, ginger , curcuma , ginseng,	Botanical origin , collection, active constituents , medicinal uses , allied drug, adulteration	1	2	a1,a2,b2,b3, c2 b1,b4,d3
8	Medicinal seeds(Type of seed, type of germination , anatomy) Calabar, fenugreek, nux-vomica, Nutmeg, castor seed, linseed	Botanical origin , collection, active constituents , medicinal uses , allied drug, adulteration	2	2	a1,a2,b2,b3,c2,d2
9	**Unorganized drugs ,gums , Arabic gum, tragecanth, Resins , balsams ,colophony**	Botanical origin , collection, active constituents , medicinal uses , allied drug, adulteration	2	4	a1,a2, b1, b2,c2, d1
10	**Final**	Final-Exam	2	4	
Number of Weeks /and Units Per Semester			**16**	**32**	

B. Practical Aspect: (if any)

Order	Tasks/ Experiments	Number of Weeks	contact hours	ILOs
1	Lin seed (Morph., T. cut, L. cut, T. S., isolated, powder)	1	**2**	c1, c4
2	Nux-vomica (Morph., T. cut, L. cut, T. S., isolated, powder), Strophanthus, Termis, Castor, stramonium	1	**2**	c2,c4
3	Foenugreek and cardamom (Morph., T. S., isolated, powder) Black mustard, White mustard, Nigella, Nutmeg, Calabar beans, Pysillium, Lepidium (morphology)Morphology of plant parts indicated in theory.	1	**2**	c2,c4

4	Mentha (Morph., T.S., isolated, powder)	**1**	**2**	c2, c3
5	Thyme (Morph., T.S., isolated, powder) Basil, Magoram, Ruta, Silybium,Lobeliac	**1**	**2**	c2,c3,
6	Datura (Morph., T. S., isolated, powder), Ephedra, Half bar, Lemon grass	**1**	**2**	c2, c3
7	Mid- term Exam	**1**	**2**	
8	Vinca (Morph., T. S., isolated, powder), Ergot, Cetraria, Carrageen, Fucus	**1**	**2**	c1, c2
9	Fennel+ Anise (Morph., T. S., isolated, powder)	**1**	**2**	c1, c2
10	Ammi-visnaga (Morph., T. S., isolated, powder), Coriander (Morph., T. S.,isolated, powder), Ammi-majus	**1**	**2**	c1, c2,c4
11	Final - Exam	**1**	**2**	
Number of Weeks /and Units Per Semester		**11**	**22**	

IV. Teaching strategies of the course:

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

V. *Assignments:*

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

VI. *Learning Resources:*

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

1. *Trease,CE and Evans,WC. Textbook of Pharmacognosy.11th to 14th Editions. Tindal L. U.K.*
2. *Tyler,VC Brady, LR and Robers JE.Pharmacognosy.8th Edition, Lea &Febeger, Philadelphia.*

2. Recommended Readings and Reference Materials.

	1. *Atal,CK and Kappor,BM.Cultivation and Utilisation of Medicianl Plants.* 2. *Wallis,TE. Textbook of Pharmacognosy,5thEdition,J&A,ChurchillLimited,U.K.* 3. *Kokate,CKPurohit,AP. And Gokhale,SB.Pharmacognosy* 4. *Walis T. A. "Textbook of Pharmacognosy", S. K. Jain for CBS Publishers & Distributors, Jain Bhawan, BholaNath Nagar, Shahdara, Delhi-110032 (India), 5th Edition, 1967, 1985, 1997,2002, 2003, 2004, 2005*
3. Essential References.	
	1. *Tyler,VC,Brady,LR and Robers,JE.Pharmacognosy.,11th to 14th Editions;* 2. *Weiss R.F. and Fintelmann V. " Herbal Medicine", Thieme, Stuttgart, New York, 2nd Ed. (2000).*
4. Electronic Materials and Web Sites etc.	
	- http://www.botanical.com - http:/www.ansci.cornell.edu/plants/medicinal/
5. Other Learning Material.	
	1. Laboratory instruments and equipments are needed 2. Data show projector

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

Course Specification of Pharmaceutical Organic Chemistry III

I. Course Identification and General Information:

١	**Course Title:**	**Pharmaceutical Organic Chemistry III**				
٢	**Course Code &Number:**	**PH1122234**				
٣	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2		1		3
٤	**Study level/ semester at which this course is offered:**	**2nd level 2nd** *semester*				
٥	**Pre –requisite:**	**Pharmaceutical Organic Chemistry II**				
٦	**Co –requisite:**	**No**				
٨	**Program (s) in which the course is offered:**	**Pharmacy**				
٩	**Language of teaching the course:**	**English**				
١٠	**Location of teaching the course:**	**Faculty of Medical Sciences – Thamar University**				
11	**Prepared By:**	**Dr. Olla Sharhan**				
12	**Date of Approval**	**2023-2024**				

II. Course Description:

The course consists of structure, bonding and functional groups of Heterocyclic, Benzo derivatives, Quinolines and Isoquinolines organic molecules. Included is a discussion of stereochemistry and the three-dimensional shape of organic molecules. The use of spectroscopic tools to determine molecular structure will cover primarily proton (^{1}H) and carbon (^{13}C) nuclear magnetic resonance spectroscopy.

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

1. Aims of The Course:

The overall aims of the course are:

1. To give a broad and deep knowledge about the fundamental principles of chemistry of heterocyclic compounds (chemistry, reactions and applications).
2. To explain the nomenclature, physical and chemical properties of the compounds in studied classes.
3. To provide the fundamental concepts of IR,1H, C13-NMR and MS; their techniques and application in structure determination.
4. To describe the pharmaceutical application of the studied topics.
5. To implement writing and presentation skills and demonstrate critical thinking.

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

A. Knowledge And Understanding:

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

Program Intended Learning Outcomes (Sub- PILOs)		Course Intended Learning Outcomes (CILOs)	
A1 A3		al	- Expand and deepen the chemical knowledge by studying the chemistry of heterocyclic and benzo derivatives compounds as important components of natural products and their applications.
		a2	-Know the reactivity and chemical behavior of heterocycles and to understand the principles of

			spectroscopic techniques

(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- Expand and deepen the chemical knowledge by studying the chemistry of heterocyclic and benzo derivatives compounds as important components of natural products and their applications.	• Lectures • Discussion Sessions • Assignments	• Periodic exam (Quizzes) • Home Assignments • Exams
a2- Know the reactivity and chemical behavior of heterocycles and to understand the principles of spectroscopic techniques		

B. Cognitive/Intellectual Skills

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

Program Intended Learning Outcomes (Sub- PILOs)		**Course Intended Learning Outcomes (CILOs)**	
B1		b1 b2 b3	-Assign names of heterocyclic compounds -Design synthetic plans for biologically active compounds of quinolones and isoquinolones, etc. - Select and justify appropriate methods of identification and purification of synthetic 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- Assign names of heterocyclic compounds	• Discussion Sessions • Problem solving • Group Discussion	• Oral presentations • Home assignments
b2- Design synthetic plans for biologically active compounds of quinolones and isoquinolone, etc.		
b3- Select and justify appropriate methods of identification and purification of synthetic compounds.		

C. **Practical/Professional Skills**

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

Program Intended Learning Outcomes (Sub-PILOs)		**Course Intended Learning Outcomes (CILOs)**	
C1 C4		c1 c2	- Proper handling of chemicals in the Lab and be aware of the rules of good laboratory practice (GLP). Synthesis of model drugs. -Conformation of purity of them through

		c3	physical and chemical methods. -Demonstrate the physicochemical characteristics of different heterocyclic benzo derivatives compounds

©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- Proper handling of chemicals in the Lab and be aware of the rules of good laboratory practice (GLP). Synthesis of model drugs **c2-** Conformation of purity of them through physical and chemical methods. **c3-** Demonstrate the physicochemical characteristics of different heterocyclic benzo derivatives compounds	• Discussion Sessions • Assignments	• Oral presentations • Exams • LAB report

D. **General And Key Transferable Skills** • **After successful completion the course, students will be able to:**			
Program Intended Learning Outcomes (Sub-PILOs)		**Course Intended Learning Outcomes (CILOs*)***	
D1 D3	.	d1 d2	- work effectively in a team and to give seminar to small group of students. - To manage time effectively

(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 and to give seminar to small group of students **d2-** To manage time effectively.	-Discussion Sessions -Assignments that require collecting information from the internet.	-Oral presentations -Writing

IV. Course Content:				
A. Theoretical Aspect:				
	Topic List	**Number of Weeks**	**Contact Hours**	**ILOs**
1-2	-Aromatic Amines and Related Nitrogen Compounds: Classification and Structure of Aromatic Amines. Configuration and the R-S Convention, The E-Z Convention for Cis–Trans Isomers. - Polyaromatic Hydrocarbons: Nomenclature and Physical and Chemical Properties (Naphthalene, Anthracene, Phenanthrene).	2	4	a1, a2, b1, d1

3	-Introduction to Heterocyclic Chemistry, Classification, and Importance of heterocyclic, 3-Membered Heterocyclic Rings with one or two heteroatoms, 4-Membered Heterocyclic Rings with one or two heteroatoms, etc.	2	4	a1, a2, b1, d1, d2
4	-5-Membered Heterocyclic Rings with one or two heteroatoms: Nomenclature, Physical Properties, Preparation, Reactions of 5-Membered Heterocyclic Rings with one & two heteroatom.	2	4	a1, a2, b1, d2
5	Benzo-derivatives of five-membered heterocycles with one heteroatom. Nomenclature, Physical Properties, Preparation.	1	2	a1, a2, b1
6	Midterm exam	1	2	
7	Monocyclic five membered Rings: Containing One heteroatom: Pyrrole, furan and thiophene: Nomenclature, Physical Properties, Preparation, reaction. Monocyclic five membered Rings Containing two heteroatoms: Pyrazole, imidazole, oxazole and thiazole: Nomenclature, Physical Properties, Preparation, reaction.	2	4	a1, a2, b1
8	6-Membered Heterocyclic Rings with one or two heteroatoms: Nomenclature, Physical Properties, Preparation, Reactions (Pyridine, Quinolines, Isoquinolines & Indole, etc.)	3	6	b2, a1
9	Spectroscopic analysis for organic compounds by FT- IR. Spectroscopic analysis for organic compounds by - Mass Spectrometry.	1	2	a2, b3, d1, d2
10	Spectroscopic analysis for organic compounds by - NMR	1	2	a2, b3, d1, d2
11	Final Exam	1	2	a2, b3, d1, d2
	Number of Weeks /and Units Per Semester	16	32	

B. Practical Aspect: (if any)				
Order	**Topics List (Tasks/ Experiments)**	**Number of weeks**	**Contact Hours**	**ILOs**
1	Introduction to laboratory and safety hazards and glassware	**1**	**2**	**c1**
2	Preparation of iodoform	**1**	**2**	**c2 ,c3**
3	preparation of aniline, Acetanilide	**1**	**2**	**c2, c3**
4	Preparation of acetyl acetate	**1**	**2**	**c2, c3**
5	Preparation of benzoic acid	**1**	**2**	**c2, c3**
6	Identification of amino group	**1**	**2**	**c2, c3**
7	Preparation of p-nitroaniline, Preparation of *p*-bromoaniline	**1**	**2**	**c2, c3**

8	Preparation of paracetamol	**1**	**2**	**c2, c3**
9	Preparation of naphthalene picrate	**1**	**2**	**c2, c3**
10	Preparation of sodium acetate	**1**	**2**	**c2, c3**
11	Preparation of salicylamide	**1**	**2**	**c2, c3**
12	NMR, IR tutorials	**1**	**2**	**c2, c3**
13	**Final Exam**	**1**	**2**	**c2, c3**
Number of Weeks /and Units Per Semester		**13**	**26**	

V. Teaching strategies of the course:

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

VI.

no	Assessment Tasks	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs(symbols)
1	**Participation, quizzes**	Each week	5	5%	a1, a2, b1, c1, d3
2	**Assignments**	6th week	5	5%	a1, a2, b3, c3, d2
3	**Mid – Exam (theoretical)**	7th week	10	10%	a1, a2, a3, b1, b2, d2
5	**Mid – Exam (practical)**	6th week	١٠	10%	c1, c2
6	**Final Exam (practical)**	13th week	20	20%	a1, a2, a3, b1, b2, d2
7	**Final Exam (theoretical)**	16th week	50	50%	a1, a2, a3, b1, b2, d2
	Total		100	100%	

VII. Learning Resources:

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

- Graham Solomons, T. W. (2008). *Organic Chemistry*, 9th ed., John Wiley and Sons, Inc., New York.
- Furniss, H., Smith, T. V. (1989). *Textbook of Practical Organic Chemistry*, 5th ed., Longman Group UK Ltd, England.
- Bansal, R. K. (2020). *Heterocyclic chemistry*. New Age International.
- Dohn, D. H., David, R. W., & Micheal, J. W. (2002). *Aromatic Compounds*. The Royal Society of Chemistry, Cambridge.
- Jacobi, P. A. (2018). *Introduction to Heterocyclic Chemistry*. John Wiley & Sons.

2. Recommended Readings and Reference Materials.

1. March's advanced organic chemistry: reactions, mechanisms, and structure By Michael Smith, Michael B. Smith, Jerry March
2. Organic Chemistry. by: T. W. Graham Solomons, 8thedition, 2003.
3. Fundamentals of Organic Chemistry by. John McMurry. Seventh Edition, 2011, Brooks/Cole 20 Davis Drive, Belmont.

3. Essential References.

	1. Organic chemistry: A short course by Harold Hart, Leslie E. Craine, David J. Hart, publisher: Houghton Miffin college; 10th edition (January 1999) ISBN: 0395902258. 2. Organic Chemistry: A Short Course. By Harold Hart, Leslie E. Craine, David J. Hart. Publisher: Houghton Mifflin College: 10th edition (January 1999) ISBM: 0395302258 3. Introduction to Organic Chemistry (Study guide & Solutions Manual).by Andrew
4. Electronic Materials and Web Sites etc.	
	- Journal of organic chemistry, biomed.net - http://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/intro1.htm - http://www.organic-chemistry.org/ - www.orgsyn.org
5. Other Learning Material.	
	- Laboratory instruments and equipments are needed - Data show projector

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