

## Course Specification of Pharmacy Management

I. Course Identification and General Information:					
١	Course Title:	Pharmacy management			
٢	Course Code & Number:	PH1124164			
٣	Credit hours:	C.H			TOTAL
		Th.	Seminar	Pr	
		1			
٤	Study level/ semester at which this course is offered:	4 <sup>th</sup> Level / 1 <sup>st</sup> Semester			
٥	Pre –requisite (if any):				
٦	Co –requisite (if any):				
٨	Program (s) in which the course is offered:	Bachelor of Pharmacy			
٩	Language of teaching the course:	English			
١٠	Location of teaching the course:	Thamar University - Faculty of Medical Sciences			
11	Prepared By:				
12	Date of Approval				

### II. Course Description:

This course is intended to provide student with knowledge of principle concepts of pharmacy management. The course covers basic management and accounting principles for community, and hospital practice regarding practice management. These include strategic management, personal management, human resource management, operations management and financial aspects of pharmacy management that can be used in the delivery of patient care.

### III. Course Objectives:

1. To provide student with essential knowledge related to pharmacy administration including organization, operational management and financial aspects.
2. To develop the student skills in diagnoses and managing of problems related to pharmacy administration field.
3. To enhance the positive attitudes towards work in field of pharmacy administration.
4. To provide a broad introduction to business management with a pharmacy focus.

## I. Course Intended Learning Outcomes (CILOs) :

### Knowledge and Understanding:

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

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

- a1. Describe** the key concepts related to operational management, strategic planning financial aspects, human resource management, quality assurance, managing personal and identify methods to incorporate these concepts into pharmacy practice
- a2. Outline** the application of pharmacy management in different managerial functions including customer service, purchasing and inventory process, types of stocks, list steps of strategic planning, and steps of planning process.
- a3. recognize** the concepts of managing personal focusing on professionalism, business ethics, management of time and workflow management that could be utilized to manage others in the capacity of a pharmacy manager.

Knowledge and Understanding PILOs

Knowledge and Understanding CILOs

After completing this program, students would be able to:

After completing this course, students would be able to:

- |    |                                                                                                                                |
|----|--------------------------------------------------------------------------------------------------------------------------------|
| A1 | Explain the fundamentals of general sciences and the basic and biomedical sciences and their relations to pharmacy profession. |
|----|--------------------------------------------------------------------------------------------------------------------------------|

A2	Illustrate the fundamentals of social and behavioral sciences relevant to pharmacy, ethics of health care and its impact on their relationship with patients and other healthcare professionals.	a1	<b>Describe</b> the key concepts related to operational management, strategic planning financial aspects, human resource management, quality assurance, managing personal and identify methods to incorporate these concepts into pharmacy practice
		a2	<b>Outline</b> the application of pharmacy management in different managerial functions including customer service, purchasing and inventory process, types of stocks, list steps of strategic planning, and steps of planning process.
		a3	<b>Recognize</b> the concepts of managing personal focusing on professionalism, business ethics, management of time and workflow management that could be utilized to manage others in the capacity of a pharmacy manager.
A3	Describe relationships between chemical structure of compounds of pharmaceutical and medicinal interest and biological activities		
A4	Define basic principles of drug: target identification, design, informatics, and mechanisms of action		
A5	Outline principles of clinical pharmacology, therapeutics and Pharmacovigilance.		

### Intellectual Skills :

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

**b1. Select** the proper drugs and **design** the proper therapeutic plan for a patients with various disease conditions using the pharmacy administration principles, such as, applying techniques in planning, and management

**b2. Interpret** the basic financial statements, ratios used in business analysis and identify sections of the business plan that would be applicable to managing or owning a business.

**b3. Identify** and **integrate** effective management methods that focus on quality assurance, effective and efficient pharmacy operations while maintaining a safe practice environment.

Intellectual Skills PILOs		Intellectual Skills CILOs	
After completing this program, students would be able to:		After completing this course, students would be able to:	
<b>B1</b>	Classify the synthetic and natural drugs according to their mechanism of action, systemic effect, therapeutic uses, contraindication and toxicity		
<b>B2</b>	Design risk reduction strategies to ensure patient safety and prevent medication errors, drug interaction, and adverse drug effects,	<b>b3</b>	<b>Identify</b> and <b>integrate</b> effective management methods that focus on quality assurance, effective and efficient pharmacy operations while maintaining a safe practice environment.
<b>B3</b>	Solve problems to reduce drug therapy problems		
<b>B4</b>	Select drug therapy regimen using mathematical, genomic, clinical pharmacokinetic and pharmacodynamics principles for optimizing the patient therapy and medication safety	<b>b1</b>	<b>Select</b> the proper drugs and <b>design</b> the proper therapeutic plan for a patients with various disease conditions using the pharmacy administration principles, such as, applying techniques in planning, and management

### Professional and Practical Skills

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

- c1. Utilize** pharmacy administration to ensure correct and safe supply of medical products.
- c2. Apply** the knowledge with pharmacy management for the best decision to estimate the profit in purchasing and inventory processes of the drugs.
- c3. Use** legal and ethical guidelines to demonstrate conflict versus negotiation, inventory and purchasing management and major job attitudes.

#### 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	<b>Utilize</b> pharmacy administration to ensure correct and safe supply of medical products.
C2	Operate different pharmaceutical equipment and instruments		
C3	Extract active substances from different sources.		
C4	Carry outpatient physical assessment.		
C5	Advise the patients and health care professionals for optimizing medicines use.	c3	<b>Use</b> legal and ethical guidelines to demonstrate conflict versus negotiation, inventory and purchasing management and major job attitudes.

### Transferable (General) Skills :

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

- d1 . Communicate** effectively with other health care professionals, utilizing of the proper pharmaceutical management.
- d2. Invent** effective and reasonable solutions related to problems of medications, according to pharmacy management.
- d3.**Has time management, rational thinking, and prudent judgment and in field of pharmacy administration.

#### 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:	
<b>D1</b>	Communicate effectively and ethically with patients, public, and health care professionals.	<b>d1</b>	<b>Communicate</b> effectively with other health care professionals, utilizing of the proper pharmaceutical management.
<b>D2</b>	Use information systems and computer softwares in order to enhance the delivery of pharmaceutical care,	<b>d2</b>	<b>Invent</b> effective and reasonable solutions related to problems of medications, according to pharmacy management.
<b>D3</b>	Work effectively individually and in a team		
<b>D4</b>	Have the skills of decision-making and time management and lifelong learning	<b>d3</b>	Has time management, rational thinking, and prudent judgment and in field of pharmacy administration.

<b>IV. Alignment Course Intended Learning Outcomes</b>			
<b>(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:</b>			
Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
<b>a1</b>	<b>Describe</b> the key concepts related to operational management, strategic planning financial aspects, human resource management, quality assurance, managing personal and identify methods to incorporate these concepts into pharmacy practice	<ul style="list-style-type: none"> <li>Lectures</li> <li>Discussion Sessions</li> <li>Assignments</li> </ul>	<ul style="list-style-type: none"> <li>Periodic exam (Quizzes)</li> <li>Evaluate assignments</li> <li>Mid &amp; final exam</li> </ul>
<b>a2.</b>	<b>Outline</b> the application of pharmacy management in different managerial functions including customer service, purchasing and inventory		

	process, types of stocks, list steps of strategic planning, and steps of planning process.		
a3.	<b>Recognize</b> the concepts of managing personal focusing on professionalism, business ethics, management of time and workflow management that could be utilized to manage others in the capacity of a pharmacy manager.		
<b>(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:</b>			
Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
b1.	<b>Select</b> the proper drugs and <b>design</b> the proper therapeutic plan for a patients with various disease conditions using the pharmacy administration principles, such as, applying techniques in planning, and management	<ul style="list-style-type: none"> <li>• Discussion Sessions</li> <li>• Problem solving</li> <li>• Group discussion</li> <li>• Assignments</li> </ul>	<ul style="list-style-type: none"> <li>• Oral presentations</li> <li>• Evaluate assignments</li> <li>• Mid &amp; final exam</li> </ul>
b2.	<b>Interpret</b> the basic financial statements, ratios used in business analysis and identify sections of the business plan that would be applicable to managing or owning a business.		
b3.	<b>Identify</b> and <b>integrate</b> effective management methods that focus on quality assurance, effective and efficient pharmacy operations while maintaining a safe practice environment.		

<b>(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:</b>			
Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
<b>c1.</b>	<b>Utilize</b> pharmacy administration to ensure correct and safe supply of medical products.	<ul style="list-style-type: none"> <li>• Discussion sessions</li> <li>• Assignments</li> </ul>	<ul style="list-style-type: none"> <li>• Oral presentations</li> <li>• Theory &amp; Practical exams</li> <li>• LAB report</li> <li>• Evaluate assignments</li> </ul>
<b>c2.</b>	<b>Apply</b> the knowledge with pharmacy management for the best decision to estimate the profit in purchasing and inventory processes of the drugs.		
<b>c3.</b>	<b>Use</b> legal and ethical guidelines to demonstrate conflict versus negotiation, inventory and purchasing management and major job attitudes.		
<b>(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:</b>			
Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
<b>d1 .</b>	<b>Communicate</b> effectively with other health professionals, utilizing of the proper pharmaceutical management.	<ul style="list-style-type: none"> <li>• Discussion Sessions</li> <li>• Assignments that require collecting information from the internet.</li> </ul>	<ul style="list-style-type: none"> <li>• Oral presentations</li> <li>• Writing</li> </ul>
<b>d2.</b>	<b>Invent</b> effective and reasonable solutions related to problems of medications, according to pharmacy management.		
<b>d3.</b>	Has time management, rational thinking, and prudent judgment and in field of pharmacy administration.		



V. Course Content:					
A – Theoretical Aspect:					
Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Management of Pharmacy Practice	- <b>Concept of Management</b> ○ Definition & skills. ○ Principles of Management ○ Organizational Structure & Behavior ○ Change management	1w	2	a1; c1;
		- <b>Management functions</b> ○ Strategic Management ○ SWOT analysis ○ Steps of strategic planning ○ Organizing	1w	2	a1; a2, b1; b3; c1;
		- <b>Financial concepts</b> ○ Finance management approaches ○ Types of ownership ○ Small business ownership ○ Financial statements ○ Financial assessment	1w	2	a1; b2; c1; d3
		- <b>Financial concepts(cont.)</b> ○ Financial ratios ○ Productivity ○ Financial aspects of business, and business plan	1w	2	a1; a3; b2;b3;c1; d3
2	Human Resource Management and Leadership	- Team work, conflict management, leadership, becoming a role model, management styles	1w	2	a1; b1; c3; d1
		- Interviewing and hiring of staff, performance management, performance appraisals, training and development of staff, workload management	1w	2	a1; b1; c1; d1
		- Customer service. - Unions in pharmacy practice	1w	2	a1; a2; b1;c1; d1
		- Concepts, tools, techniques and application of marketing in the health care and health insurance plan	1w	2	a1; b1; c1; d1

3	Managing Operations	<ul style="list-style-type: none"> <li>- Pharmacy layout/design</li> <li>- Workflow management</li> <li>- Scheduling</li> <li>- Time management</li> <li>- Safety in the workplace</li> </ul>	1w	2	a1; b3; c1; d3
		<ul style="list-style-type: none"> <li>- <b>Material Management</b> <ul style="list-style-type: none"> <li>○ Inventory management and control</li> <li>○ Purchasing (objectives, process)</li> <li>○ Turnover</li> <li>○ Stores (types of stocks)</li> <li>○ IT and automation in pharmacy</li> <li>○ Loss prevention</li> </ul> </li> </ul>	1w	2	a1; a2; b3; c2; c3; d2
		<ul style="list-style-type: none"> <li>- <b>Production Management</b> <ul style="list-style-type: none"> <li>○ Visible and Invisible inputs</li> <li>○ Methodology of Activities</li> <li>○ Performance Evaluation</li> <li>○ Technique Process</li> <li>○ Flow Process</li> <li>○ Maintenance Management</li> </ul> </li> </ul>	1w	2	a1; b3;c1; d1
4	Quality assurance in pharmacy practice	<ul style="list-style-type: none"> <li>- <b>Quality Assurance in Pharmacy Practice – Community</b> <ul style="list-style-type: none"> <li>○ Management of drug shortages, recalls, disposal of drugs, expired drugs</li> <li>○ Reporting errors, medication incidents</li> </ul> </li> </ul>	1w	2	a1; b3; c1; d2
		<ul style="list-style-type: none"> <li>- <b>Quality Assurance in Pharmacy Practice – Hospital</b> <ul style="list-style-type: none"> <li>○ Management of drug shortages, recalls, disposal of drugs, expired drugs</li> <li>○ Reporting errors</li> <li>○ Medication incidents</li> </ul> </li> </ul>	1w	2	a1; b3; c1; d2
5	Managing Personal Practice	<ul style="list-style-type: none"> <li>- Business Ethics</li> <li>- Pharmacy manager responsibilities</li> <li>- Time management 3<sup>rd</sup> party plans</li> </ul>	1w	2	a1; a3; b2; c1; c3; d3
Number of Weeks /and Units Per Semester					

## VI. Teaching strategies of the course:

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

## V. Assignments:

No	Assignments	Mark	Week Due	Aligned CILOs(symbols)
1	Participation	5	Weekly	a1; a2; a3; b1; b2; d2
2	Quizzes	5	Weekly	a1; a2; a3; b1; b2; d2
3	Research	5	6 <sup>th</sup> W	a12 a3; b1; b2; b3;c1; c2; d2;
4	Assignments	5	6 <sup>th</sup> W	a1; a2; a3; b1; b2;c1; d2
5	Mid – Exam (theoretical)	20	7 <sup>th</sup> W	a1; a2; a3; b1; b2;
	<b>Total score</b>	<b>40%</b>		

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments & Homework, Tasks & Presentation	Fortnightly	10	10%	a1; a2; a3; b1; b2; c1; d2
2	Quizzes	W6	5	5%	a1; a2; a3; b1; b2; d2
3	Mid-Term exam	W8	20	20%	a1; a2; a3; b1; b2
4	Practical reports	W12	5	5%	a1; a2; a3; b1; b2; c2
6	Final Exam theory	W16	60	60%	a1; a2; a3; b1; b2
<b>Total</b>			<b>100</b>	<b>100%</b>	

## VI. Learning Resources:

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

1. Pharmacy Business Management, Steven Kayne, Glasgow, England.
2. Financial Management for Pharmacists, Norman V. Carroll, Carroll.

### 2- Essential References.

1. Desselle S. Zgarrick D. Alston G. Pharmacy Management: Essentials for all Practice Settings. 3<sup>rd</sup> ed (2012). McGraw-Hill.
1. Chisholm-Burns, M., Vaillancourt, A.M. & Sheperd, M. (eds.) (2011). Pharmacy management, leadership, and finance. Sudbury, Mass.: Jones and Bartlett Publishers.

### 3- Electronic Materials and Web Sites etc.

- <http://www.accesspharmacy.com>.

## Course Specification of **Pharmaceutical Toxicology**

I. Course Identification and General Information:					
1	Course Title:	Pharmaceutical Toxicology			
2	Course Code & Number:	PH1124154			
3	Credit hours:	C.H			TOTAL
		Th.	Seminar	Pr	
		2		1	
4	Study level/ semester at which this course is offered:	4 <sup>th</sup> Level / 1 <sup>st</sup> 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. Ahmed G. Al- Akydy – Dr. Ahmed Al-Washli			
11	Date of Approval	2021			

## II. Course Description:

The course provides student with comprehensive knowledge and clear understanding of the principles of toxicology including the mechanism of toxicity, target organ and treatment of toxicity. Natural toxins including plants, animal, pesticides, heavy metals, toxic gases, irritant toxins, household toxin and food toxins, as well as antidotes and their mechanism of action. Also the course covers experiments of simple tests for toxicological screening.

## III. Course Objectives:

1. To provide student with general knowledge on toxicology
2. To describe sources, mechanisms of action and toxic profile of various poisons including drugs
3. To describe symptoms of toxicity, appropriate measures for management and first aid measures after exposure to different types of toxic substances.
4. To describe methods for identification of poisons.

## I. Course Intended Learning Outcomes (CILOs) :

### Knowledge and Understanding:

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

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

- a1 understand the general terminology in toxicology including toxicity, toxins and their antidotes.
- a2. Know the basic principles of toxicokinetics and toxicodynamics
- a3. Outline different types of toxicants, including plants, animal, pesticides, heavy metals, toxic gases, irritant toxins, household toxin and food toxins, and describe the different approaches to manage their toxicity.

#### 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:

- |           |                                                                                                                                                |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A1</b> | Explain the fundamentals of general sciences and the basic and biomedical sciences and their relations to pharmacy profession.                 |
| <b>A2</b> | Illustrate the fundamentals of social and behavioral sciences relevant to pharmacy, ethics of health care and its impact on their relationship |

- |    |                                                                                                         |
|----|---------------------------------------------------------------------------------------------------------|
| a1 | <b>Understand</b> the general terminology in toxicology including toxicity, toxins and their antidotes. |
|    |                                                                                                         |

	with patients and other healthcare professionals.		
A3	Describe relationships between chemical structure of compounds of pharmaceutical and medicinal interest and biological activities	a2	<b>Know</b> the basic principles of toxicokinetics and toxicodynamics
A4	Define basic principles of drug: target identification, design, informatics, and mechanisms of action	a3	<b>Outline</b> different types of toxicants, including plants, animal, pesticides, heavy metals, toxic gases, irritant toxins, household toxin and food toxins, and describe the different approaches to manage their toxicity.
A5	Outline principles of clinical pharmacology, therapeutics, and Pharmacovigilance.		

### Intellectual Skills :

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

b1 Detect, and analyze, toxin-related problems from different sources

b2 .Evaluate the effects of a given toxic agent on the human body

b3. Appraise the effectiveness of the preventive measures available to reduce the burden of toxic agents and protect human and other living organisms from toxic agents

#### 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** **Detect**, and analyze, toxin-related problems from different sources

**B2** Design risk reduction strategies to ensure patient safety and prevent medication errors, drug interaction, and adverse drug effects,

**b3** **Appraise** the effectiveness of the preventive measures available to reduce the burden of toxic agents and protect human and other living organisms from toxic agents

**B3** Solve problems to reduce drug therapy problems

**b3** **Appraise** the effectiveness of the preventive measures available to reduce the burden of toxic agents and protect human and other living organisms from toxic agents

<b>B4</b>	Select drug therapy regimen using mathematical, genomic, clinical pharmacokinetic and pharmacodynamics principles for optimizing the patient therapy and medication safety	<b>b2</b>	<b>Evaluate</b> the effects of a given toxic agent on the human body
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<b>Professional and Practical Skills</b>			
<b>Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)</b>			
c1Apply the knowledge with the clinical skills and some screening laboratory methods in diagnoses and identifying of the different toxicities			
c2Use the appropriate antidotes for the corresponding poison, their mechanisms of actions, routes of administration and any special precautions.			
C3 Apply different methods and techniques in the management and treatment of poisoning cases of therapeutic and non-therapeutic agents.			
<b>Professional and Practical Skills PILOs</b>		<b>Professional and Practical Skills CILOs</b>	
<b>After completing this program, students would be able to:</b>		<b>After completing this course, students would be able to:</b>	
C1	Handle the chemical, biological, and pharmaceutical materials safely		
C2	Operate different pharmaceutical equipment and instruments		
C3	Extract active substances from different sources.		
C4	Carry outpatient physical assessment.	c1	<b>Apply</b> the knowledge with the clinical skills and some screening laboratory methods in diagnoses and identifying of the different toxicities
C5	Advise the patients and health care professionals for optimizing medicines use.	c2	<b>Use</b> the appropriate antidotes for the corresponding poison, their mechanisms of actions, routes of administration and any



		special precautions.
	c3	<b>Apply</b> different methods and techniques in the management and treatment of poisoning cases of therapeutic and non-therapeutic agents.

**Transferable (General) Skills :**

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)			
<p>d1 Use different sources to obtain information and knowledge about different issues in toxicology d2. communicate effectively with general population, others health care providers regarding any issue in the field of toxicology.</p>			
Transferable (General) Skills PILOs		Transferable (General) Skills CILOs	
After completing this program, students would be able to:		After completing this course, students would be able to:	
D1	Communicate effectively and ethically with patients, public, and health care professionals.	d2	<b>Communicate</b> effectively with general population, others health care providers regarding any issue in the field of toxicology.
D2	Use information systems and computer softwares in order to enhance the delivery of pharmaceutical care,	d1	<b>Use</b> different sources to obtain information and knowledge about different issues in toxicology
D3	Work effectively individually and in a team	d2	<b>Communicate</b> effectively with general population, others health care providers regarding any issue in the field of toxicology.
D4	Have the skills of decision-making and time management and lifelong learning		

**II. 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	<ul style="list-style-type: none"> <li>Lectures</li> <li>Discussion Sessions</li> <li>Assignments</li> </ul>	<ul style="list-style-type: none"> <li>Periodic exam (Quizzes)</li> <li>Evaluate assignments</li> <li>Mid &amp; final exam</li> </ul>	
a2			<p><b>Understand</b> the general terminology in toxicology including toxicity, toxins and their antidotes.</p>
a3			<p><b>Know</b> the basic principles of toxicokinetics and toxicodynamics</p> <p><b>Outline</b> different types of toxicants, including plants, animal, pesticides, heavy metals, toxic gases, irritant toxins, household toxin and food toxins.</p>
(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:			
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies	
b1	<ul style="list-style-type: none"> <li>Discussion Sessions</li> <li>Problem solving</li> <li>Group discussion</li> <li>Assignments</li> </ul>	<ul style="list-style-type: none"> <li>Oral presentations</li> <li>Evaluate assignments</li> <li>Mid &amp; final exam</li> </ul>	
b2			<p><b>Detect</b>, and <b>analyze</b>, toxin-related problems from different sources</p>
b3.			<p><b>Evaluate</b> the effects of a given toxic agent on the human body</p> <p><b>Appraise</b> the effectiveness of the preventive measures available to reduce the burden of toxic agents and protect human and other living organisms from toxic agents</p>

(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching

Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1	<ul style="list-style-type: none"> <li>• Discussion sessions</li> <li>• Assignments</li> </ul>	<ul style="list-style-type: none"> <li>• Oral presentations</li> <li>• Theory &amp; Practical exams</li> <li>• LAB report</li> <li>• Evaluate assignments</li> </ul>
c2		
c3		
<b>(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:</b>		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1	<ul style="list-style-type: none"> <li>• Discussion Sessions</li> <li>• Assignments that require collecting information from the internet.</li> </ul>	<ul style="list-style-type: none"> <li>• Oral presentations</li> <li>• Writing</li> </ul>
d2		

## V. Course Content:

### A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	General principles of toxicology	<ul style="list-style-type: none"> <li>- Definitions</li> <li>- Classification of toxicology</li> <li>- Types of poisoning</li> <li>- Mode of poisoning</li> </ul>	1w	2	a1; a2; b2;
		<ul style="list-style-type: none"> <li>- Toxicokinetics: Absorption, Distribution, Metabolism &amp; Excretion</li> <li>- Toxicodynamics: <ul style="list-style-type: none"> <li>o Mechanism of toxicity</li> <li>o Toxic action (acute toxicity, chemical carcinogenesis, teratogenesis)</li> </ul> </li> <li>- General factors affecting toxicity</li> </ul>	1w	2	a2; b2;
2	General Management of poisoning	<ul style="list-style-type: none"> <li>- Decontamination</li> <li>- Emesis</li> <li>- Stomach lavage</li> <li>- Chelators</li> <li>- Enhancing elimination of the toxin</li> <li>- Alkalization &amp; acidification of urine</li> <li>- Dialysis (hemodialysis, peritoneal dialysis)</li> <li>- antidotes</li> </ul>	1w	2	a3; b1; c2; d2
3	Corrosives and Irritants	<ul style="list-style-type: none"> <li>- Acids <ul style="list-style-type: none"> <li>o Uses</li> <li>o Exposure Routes and Pathways</li> <li>o Toxicokinetics,</li> <li>o Mechanism of Toxicity ( Acute Toxicity, Chronic Toxicity)</li> <li>o Clinical Management of each of substances</li> </ul> </li> </ul>	1w	2	a1; a2; a3; b1; b2; b3; c2; d2
		<ul style="list-style-type: none"> <li>- Alkalies <ul style="list-style-type: none"> <li>o Uses</li> <li>o Exposure Routes and Pathways</li> <li>o Toxicokinetics</li> <li>o Mechanism of Toxicity( Acute Toxicity, Chronic</li> </ul> </li> </ul>	1w	2	a1; a2; a3; ; b1; b2; b3;c2; d2

		Toxicity ○ Clinical Management of each of substances			
4	Common Heavy Metals toxicity	- Lead - Mercury	1w	2	a1; a2; a3; ; b1; b2; b3; c2; d2
		- Arsenic - Iron	1w	2	a1; a2; a3; ; b1; b2; b3; c2; d2
5	Pesticides	- Halogenated & cholinesterase inhibitor insecticides	1w	2	a1; a2; a3; ; b1; b2; b3; c2; d2
		- Rodenticides - Herbicides - Fungicides	1w	2	a1; a2; a3; ; b1; b2; b3c2; d2
6	Gaseous Poisoning	- CO - Cyanide	1w	2	a1; a2; a3; ; b1; b2; b3; c2; d2
7	Volatile poisons	- Ethanol - Methanol - Ethylene glycol	1w	2	a1; a2; a3; ; b1; b2; b3; c2; d2
8	Poisonous plants	- Opium - Coca - Cannabinoids - Mushrooms - Mycotoxins	1w	2	a1; a2; a3; ; b1; b2; b3; c2; d2
9	Poisonous animals	- Scorpion venom - Snakes venom - Rabbits	1w	2	a1; a2; a3; ; b1; b2; b3; c2; d2
10	Food Poisonings	- Bacterial and fungal toxins	1w	2	a1; a2; a3; ; b1; b2; b3; c2; d2
<b>Number of Weeks /and Units Per Semester</b>			<b>14</b>	<b>24</b>	

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

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes (CILOs)
-------	--------------------	-----------------	---------------	---------------------------

1	Introduction <ul style="list-style-type: none"> <li>General instructions</li> <li>Methods of extraction of poisons</li> </ul>	1w	1	c1
2	The normal characteristics of poisonous animals	1w	1	c1
3	Dose Calculations	1w	1	c1
4	Determination of LD50	1w	1	c1
5	Detection of alkaline and Acidic corrosives	1w	1	c1
6	Detection of unknown corrosive poisons	1w	1	c1
7	Detection of heavy metal using chemical & Reinschesb tests	1w	1	c1
8	Toxicity of Cyanide and volatile poisons	1w	1	c1
9	Detection of Organophosphorus	1w	1	c1
10	Detection of analgesics (Salicylates + acetaminophen)	1w	1	c1
11	Detection of analgesics (morphine and related drugs)	1w	1	c1
12	Detection of CNS depressants (Barbiturates + BDZs + TCA)	1w	1	c1
13	Detection of stimulants (amphetamines, decongestants, methylxanthines)	1w	1	c1
14	Detection of anticoagulants	1w	1	c1
<b>Number of Weeks /and Units Per Semester</b>		<b>14</b>	<b>14</b>	

## VI. Teaching strategies of the course:

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

## VII. Assignments:

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

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments & Homework, Tasks & Presentation	Fortnightly	5	5%	a1; a2; a3; b2; c2; d1; d2
2	Quizzes	W6	2.5	2.5%	a1; a2; a3;

					b2;c2
3	Mid-Term exam	W8	10	10%	a1; a2; a3; b2
4	Practical reports	W12	2.5	2.5%	a1; b3; c2; c3; d2; d3; d4
5	Final exam practical	W 15	30	30%	a1; a2; a3; b2; c1; c3
6	Final Exam theory	W16	50	50%	a1; a2; a3; b2
<b>Total</b>			<b>100</b>	<b>100%</b>	

<b>VI. Learning Resources:</b>	
<b>1- Required Textbook(s) ( maximum two ).</b>	
	<ol style="list-style-type: none"> <li>1. Klaassen CD. <i>Casarett &amp; Doull's Toxicology – The basic science of poisons</i>, 8th edition, McGraw Hill, 2013</li> <li>2. Modern medical Toxicology VV pillay. 2008</li> </ol>
<b>2- Essential References.</b>	
	<ol style="list-style-type: none"> <li>1. Emergency Toxicology by Peter Viccellio, Lippincott Williams &amp;Wilkins;2nd edition (1998).</li> <li>2. Poisoning &amp; Toxicology Compendium by Leikin, Jerrold B. LexiComp,U.S. (1998) Casarett &amp; Doull's essentials of Toxicology 2008.</li> <li>3. Casarett and Doull's essentials of Toxicology, 3<sup>rd</sup> edition, 2015, Curtis D. Klaassen and John B. We III</li> </ol>
<b>3- Electronic Materials and Web Sites etc.</b>	
	<p><b>Electronic Web Sites:</b></p> <ul style="list-style-type: none"> <li>• <a href="http://www.google.com">www.google.com</a></li> <li>• <a href="http://www.pubmed.com">www.pubmed.com</a></li> <li>• <a href="http://www.biomed.net">www.biomed.net</a></li> <li>• <a href="http://www.ncbi.nlm.nih.gov">www.ncbi.nlm.nih.gov</a></li> </ul>





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



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

## Faculty of Medical Sciences

Department of Pharmacy

Program of Bachelors Pharmacy

## Course Specification of

Biopharmaceutics & Pharmacokinetics 1

Course Code. (PH1124174)

2024



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

## I. General Information:

1.	Course Title:	<b>Biopharmaceutics &amp; Pharmacokinetics 1</b>				
2.	Course Code:	PH1124174				
3.	Course Type:					
4.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours	
			Lecture	Tutorial/ Seminar	Lab	Clinical
		2	2	--		--
5.	Level/ Semester at which this Course is offered:	4 <sup>th</sup> Level / 1 <sup>st</sup> Semester				
6.	Pre –Requisite (if any):	Pharmaceutics III and Biochemistry II				
7.	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. Abdulkarim K. Alzomor				
12.	Reviewed By:					
13.	Date and Number of Approval by Council:					

### Course Specification of: Biopharmaceutics & Pharmacokinetics 1 Code. (PH1124174)

Prepared by:

Reviewed by:

Head of the Department:

Dean of Faculty:

Dean of Center of Development  
and Quality assurance:

## II. Course Description:

This course covers routes of drugs administration, the mechanism of drugs absorption, distributions, metabolism and excretion and the different factors which effect in these processes. The course covers Bioavailability, Bioequivalence, the importance of bioequivalence study and the protocols for designed bioequivalence study. Also cover drugs discovery and development phases.

## III. Course Description:

### III. Course Intended Learning Outcomes (CILOs) :

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

### Referenced PILOs

A. Knowledge and Understanding:		I, P or M/A		
a1	Identify the biologic, physiologic, and pathologic factors, which influence drugs' absorption, disposition and response in the body.	M	A4	High accuracy identifies the physical & chemical properties & the toxic effects of various materials used in the preparation of medicines whether effective & ineffective.
a2	Explain how physical and chemical drugs' properties, dosage form and route of administration can influence drug performance in the body	M	A5	Enumerate correctly the principles of pharmacokinetics & biopharmaceutics & and their applications in pharmacological therapy.
B. Intellectual Skills:				
b1	Predict the mechanism for drugs metabolism, excretion and drug accumulation in the body and cause toxic effect.	M	B5	Carefully analyzes, the doses & pharmacokinetics by using calculations & statistical methods & information techniques.
C. Professional and Practical Skills:				
c1	Utilize the in vivo and in vitro excrement to analysis and evaluate the quality of the drugs.	M	C4	Efficiently operates, the different technologies and equipment in the area of pharmacy.
D. Transferable Skills:				
d1	Perform tasks and costs of the course	M	D1	Works effectively in a unique

### Course Specification of: Biopharmaceutics & Pharmacokinetics 1 Code. (PH1124174)

	independently and be able to work as an effective member in a team			team.
d2	Employ the technologies services to solve problems of pharmaceutical calculation and develop skills.	M	D2	Correctly uses, the means of the technology, information, programs of computer and the statistical programs, which contribute in raising the health level.

I= Introduced, P=Practiced or M/A= Mastered/Advanced

#### IV. Alignment of Course Intended Learning Outcomes

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

Course Intended Learning Outcomes		Teaching Strategies	Assessment Strategies
a1	Identify the biologic, physiologic, and pathologic factors, which influence drugs' absorption, disposition and response in the body.	<ul style="list-style-type: none"> <li>- Lectures and Groups discussion.</li> <li>- Self – learning</li> </ul>	<ul style="list-style-type: none"> <li>▪ Quizzes, Presentation and Written exam.</li> </ul>
a2	Explain how physical and chemical drugs' properties, dosage form and route of administration can influence drug performance in the body		

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

Course Intended Learning Outcomes		Teaching Strategies	Assessment Strategies
b1	Predict the mechanism for drugs metabolism, excretion and drug accumulation in the body and cause toxic effect.	<ul style="list-style-type: none"> <li>- Dialogue and discussion</li> <li>- solving Problem</li> </ul>	<ul style="list-style-type: none"> <li>- Quizzes, Homework</li> </ul>

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

Course Intended Learning Outcomes		Teaching Strategies	Assessment Strategies
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#### Course Specification of: Biopharmaceutics & Pharmacokinetics 1 Code. (PH1124174)

Prepared by:

Reviewed by:

Head of the Department:

Dean of Faculty:

Dean of Center of Development and Quality assurance:

c1	Utilize the in vivo and in vitro excrement to analysis and evaluate the quality of the drugs.	<ul style="list-style-type: none"> <li>- Lectures</li> <li>- Simulation &amp; presentations</li> </ul>	<ul style="list-style-type: none"> <li>▪ Performance, Report</li> </ul>
<b>(D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods:</b>			
<b>Course Intended Learning Outcomes</b>		<b>Teaching Strategies</b>	<b>Assessment Strategies</b>
d1	Perform tasks and costs of the course independently and be able to work as an effective member in a team	<ul style="list-style-type: none"> <li>- Self – learning</li> <li>- Cooperative learning</li> </ul>	<ul style="list-style-type: none"> <li>- Homework's evaluation.</li> <li>▪ Evaluation of Research reports</li> </ul>
d2	Employ the technologies services to solve problems of pharmaceutical calculation and develop skills.		

## V. Course Contents:

### A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Routes of Drug Administration	<ul style="list-style-type: none"> <li>• Definition and importance of drug administration.</li> <li>• Types of route administration</li> <li>• Advantage and disadvantage for different routes.</li> </ul>	1	2	a1, a2, b1, d2
2	Introduction to Biopharmaceutics	<ul style="list-style-type: none"> <li>• Definition of some terms used in biopharmaceutics</li> <li>• Aims of studying of biopharmaceutics</li> <li>• Plasma –time level curve and drug parameters.</li> <li>• Bioavailability, Advantages and Disadvantages</li> </ul>	1	2	a1, a2, b1, d1, d2

### Course Specification of: Biopharmaceutics & Pharmacokinetics 1 Code. (PH1124174)

Prepared by:

Reviewed by:

Head of the Department:

Dean of Faculty:

Dean of Center of Development and Quality assurance:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
3	GIT drug absorption	<ul style="list-style-type: none"> <li>• Definition</li> <li>• Mechanism of drug absorption</li> <li>• Physiological factors affecting oral absorption</li> <li>• Physical-Chemical factors affecting oral absorption</li> <li>• Formulation factors affecting oral absorption</li> <li>• Techniques for the GIT absorption assessment</li> </ul>	3	6	a1, a2, b1, d1, d2
4	Biopharmaceutics study of drug distribution	<ul style="list-style-type: none"> <li>• Definitions</li> <li>• Volume of distribution</li> <li>• Drug distribution to special tissue <ul style="list-style-type: none"> <li>○ Brain</li> <li>○ Placenta</li> </ul> </li> <li>• Factors affecting drug distribution</li> <li>• Binding to plasma proteins</li> <li>• Factors affecting protein binding</li> <li>• Drug interaction in protein binding</li> </ul>	2	4	a1, a2, b1, d1, d2
5	<ul style="list-style-type: none"> <li>• Mid Exam</li> </ul>		1	2	a1, a2, b1, d1, d2
6	Biopharmaceutics study of drug metabolism	<ul style="list-style-type: none"> <li>• Definitions</li> <li>• Role of drug metabolism</li> <li>• Drug metabolism sites</li> <li>• Metabolic pathway</li> <li>• Metabolism enzymes</li> <li>• Metabolism phases</li> <li>• Factors affecting drug metabolism</li> <li>• Drug interaction in metabolism</li> <li>• Extrahepatic metabolism</li> <li>• Prodrugs</li> </ul>	2	4	a1, a2, b1, d1, d2
7	Biopharmaceutics study of Drug excretion	<ul style="list-style-type: none"> <li>• Definitions</li> <li>• Role and pathway of excretion</li> <li>• Types of excretion <ul style="list-style-type: none"> <li>○ Renal excretion</li> <li>○ Non-renal excretion</li> </ul> </li> </ul>	2	4	a1, a2, b1, c1, d1, d2

**Course Specification of: Biopharmaceutics & Pharmacokinetics 1 Code. (PH1124174)**

Prepared by:

Reviewed by:

Head of the Department:

Dean of Faculty:

Dean of Center of Development and Quality assurance:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
		<ul style="list-style-type: none"> <li>▪ Biliary excretion</li> <li>▪ Mammary excretion</li> <li>▪ Salivary excretion</li> <li>▪ Skin excretion</li> <li>▪ Pulmonary excretion</li> <li>▪ GIT excretion</li> <li>▪ Genital excretion</li> </ul> <ul style="list-style-type: none"> <li>• Factors Affecting Renal Excretion</li> <li>• Clearance</li> <li>• Drug interaction</li> </ul>			
8	Bioavailability and bioequivalence	<ul style="list-style-type: none"> <li>• Historical aspects.</li> <li>• Definitions.</li> <li>• Objectives and significance of BA/BE studies.</li> <li>• Factors affecting Bioavailability.</li> <li>• Measurement of Bioavailability.</li> <li>• Methods for enhancing Bioavailability.</li> <li>• Introduction to Bioequivalence.</li> <li>• Limitations of BA/BE studies</li> <li>• Protocol design of bioavailability assessment.</li> <li>• Methods of bioequivalence determination</li> </ul>	2	4	a1, a2, c1, d1, d2
9	Drugs discovery and development	<ul style="list-style-type: none"> <li>• Pre-phase</li> <li>• Phase I</li> <li>• Phase II</li> <li>• Phase III</li> <li>• Phase IV</li> </ul>	1	2	a1, a2, b1, c1, d1, d2
10		<b>Final exam</b>	<b>1</b>	<b>2</b>	a1, a2, b1, c1, d1, d2
<b>Number of Weeks /and Units Per Semester</b>			<b>16</b>	<b>32</b>	

## VI. Assignments:

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	Assignment 1: Attendance	1-14	10	a1, a2, b1, c1, d1, d2
2	Assignment 2: Homework, Research & Quizzes.	6&12	10	a1, a2, b1, c1, d1, d2
Total			20	

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments	1-14	20	20%	a1, a2, b1, c1, c2 d1, d2
2	Mid-Term Theoretical Exam	8	30	30%	a1, a2, b1.
5	Final Theoretical Exam	16	50	50%	a1, a2, b1, c1, c2 d1, d2
Total			100	100%	

## VIII. Learning Resources:

- Written in the following order: Author, Year of publication, Title, Edition, Place of publication, Publisher.

### 1- Required Textbook(s) (maximum two):

- Leon Shargel Andrew (2012). Applied Biopharmaceutics and Pharmacokinetics, Sixth edition, Lippincott's and William, Philadelphia

### 2- Essential References:

## Course Specification of: Biopharmaceutics & Pharmacokinetics 1 Code. (PH1124174)

Prepared by:

Reviewed by:

Head of the Department:

Dean of Faculty:

Dean of Center of Development and Quality assurance:



1. Michel E. Winter (2011). Basic clinical pharmacokinetics, Fifth edition, Lippincott's and William, San Francisco.

**Websites:**

1. [www.boomer.org](http://www.boomer.org)

**IX. Course Policies: (Based on the Uniform Students' By law (2007))**

<b>1</b>	<b>Class Attendance:</b> Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
<b>2</b>	<b>Tardiness:</b> A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
<b>3</b>	<b>Exam Attendance/Punctuality:</b> No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
<b>4</b>	<b>Assignments &amp; Projects:</b> Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
<b>5</b>	<b>Cheating:</b> Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
<b>6</b>	<b>Forgery and Impersonation:</b> Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
<b>7</b>	<b>Other policies:</b> The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.

## Faculty of Medical Sciences

Department of Pharmacy

Program of Bachelors Pharmacy

# Course Plan (Syllabus) of Biopharmaceutics & Pharmacokinetics I Course Code. PH1124174

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

2024

## II. Course Identification and General Information:

1.	Course Title:	Biopharmaceutics & Pharmacokinetics 1				
2.	Course Code:	PH1124174				
3.	Course Type:					
4.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours	
			Lecture	Tutorial/ Seminar	Lab	Clinical
		2	2	--		--
5.	Level/ Semester at which this Course is offered:	4 <sup>th</sup> Level / 1st Semester				
6.	Pre –Requisite (if any):	Pharmaceutics III and Biochemistry II				
7.	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. Abdulkarim K. Alzomor				
12.	Reviewed By:					
13.	Date and Number of Approval by Council:					

### Course Specification of: Biopharmaceutics & Pharmacokinetics 1 Code. (PH1124174)

Prepared by:

Reviewed by:

Head of the Department:

Dean of Faculty:

Dean of Center of Development  
and Quality assurance:

### III. Course Description:

This course covers routes of drugs administration, the mechanism of drugs absorption, distributions, metabolism and excretion and the different factors which effect in these processes. The course covers Bioavailability, Bioequivalence, the importance of bioequivalence study and the protocols for designed bioequivalence study. Also cover drugs discovery and development phases.

### IV. Course Intended Learning Outcomes (CILOs) :

Upon successful completion of the Course, student will be able to:

#### A. Knowledge and Understanding:

- |    |                                                                                                                                         |
|----|-----------------------------------------------------------------------------------------------------------------------------------------|
| a1 | Identify the biologic, physiologic, and pathologic factors, which influence drugs' absorption, disposition and response in the body     |
| a2 | Explain how physical and chemical drugs' properties, dosage form and route of administration can influence drug performance in the body |

#### B. Intellectual Skills:

- |    |                                                                                                                 |
|----|-----------------------------------------------------------------------------------------------------------------|
| b1 | Predict the mechanism for drugs metabolism, excretion and drug accumulation in the body and cause toxic effect. |
|----|-----------------------------------------------------------------------------------------------------------------|

#### C. Professional and Practical Skills:

- |    |                                                                                               |
|----|-----------------------------------------------------------------------------------------------|
| c1 | Utilize the in vivo and in vitro excrement to analysis and evaluate the quality of the drugs. |
|----|-----------------------------------------------------------------------------------------------|

#### D. Transferable Skills:

- |    |                                                                                                          |
|----|----------------------------------------------------------------------------------------------------------|
| d1 | Perform tasks and costs of the course independently and be able to work as an effective member in a team |
| d2 | Employ the technologies services to solve problems of pharmaceutical calculation and develop skills.     |

I= Introduced, P=Practiced or M/A= Mastered/Advanced

## V. Course Contents:

### A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1	<b>Routes of Drug Administration</b>	<ul style="list-style-type: none"> <li>Definition and importance of drug administration.</li> <li>Types of route administration</li> <li>Advantage and disadvantage for different routes.</li> </ul>	1	2
2	<b>Introduction to Biopharmaceutics</b>	<p>Definition of some terms used in biopharmaceutics</p> <ul style="list-style-type: none"> <li>Aims of studying of biopharmaceutics</li> <li>Plasma –time level curve and drug parameters.</li> <li>Bioavailability, Advantages and Disadvantages</li> </ul>	1	2
3	<b>GIT drug absorption</b>	<ul style="list-style-type: none"> <li>Definition</li> <li>Mechanism of drug absorption</li> <li>Physiological factors affecting oral absorption</li> <li>Physical-Chemical factors affecting oral absorption</li> <li>Formulation factors affecting oral absorption</li> <li>Techniques for the GIT absorption assessment</li> </ul>	3	6
4	Biopharmaceutics study of drug distribution	<p>Definitions</p> <ul style="list-style-type: none"> <li>Volume of distribution</li> <li>Drug distribution to special tissue <ul style="list-style-type: none"> <li>Brain</li> <li>Placenta</li> </ul> </li> <li>Factors affecting drug distribution</li> <li>Binding to plasma proteins</li> <li>Factors affecting protein binding</li> <li>Drug interaction in protein binding</li> </ul>	2	4
5	Mid Exam		1	2
6	Biopharmaceutics study	Definitions	2	4

### Course Specification of: Biopharmaceutics & Pharmacokinetics 1 Code. (PH1124174)

Prepared by:

Reviewed by:

Head of the Department:

Dean of Faculty:

Dean of Center of Development and Quality assurance:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
	of drug metabolism	<ul style="list-style-type: none"> <li>• Role of drug metabolism</li> <li>• Drug metabolism sites</li> <li>• Metabolic pathway</li> <li>• Metabolism enzymes</li> <li>• Metabolism phases</li> <li>• Factors affecting drug metabolism</li> <li>• Drug interaction in metabolism</li> <li>• Extrahepatic metabolism</li> </ul> Prodrugs		
7	Biopharmaceutics study of Drug excretion	Definitions <ul style="list-style-type: none"> <li>• Role and pathway of excretion</li> <li>• Types of excretion               <ul style="list-style-type: none"> <li>○ Renal excretion</li> <li>○ Non-renal excretion                   <ul style="list-style-type: none"> <li>▪ Biliary excretion</li> <li>▪ Mammary excretion</li> <li>▪ Salivary excretion</li> <li>▪ Skin excretion</li> <li>▪ Pulmonary excretion</li> <li>▪ GIT excretion</li> <li>▪ Genital excretion</li> </ul> </li> </ul> </li> <li>• Factors Affecting Renal Excretion</li> <li>• Clearance</li> <li>• Drug interaction</li> </ul>	2	4
8	Bioavailability and bioequivalence	Historical aspects. <ul style="list-style-type: none"> <li>• Definitions.</li> <li>• Objectives and significance of BA/BE studies.</li> <li>• Factors affecting Bioavailability.</li> <li>• Measurement of Bioavailability.</li> <li>• Methods for enhancing Bioavailability.</li> <li>• Introduction to Bioequivalence.</li> <li>• Limitations of BA/BE studies</li> <li>• Protocol design of bioavailability assessment.</li> <li>• Methods of bioequivalence determination</li> </ul>	2	4
9	Drugs discovery and development	Pre-phase <ul style="list-style-type: none"> <li>• Phase I</li> <li>• Phase II</li> </ul>	1	2

**Course Specification of: Biopharmaceutics & Pharmacokinetics 1 Code. (PH1124174)**

Prepared by:

Reviewed by:

Head of the Department:

Dean of Faculty:

Dean of Center of Development and Quality assurance:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
		<ul style="list-style-type: none"> <li>Phase III</li> <li>Phase IV</li> </ul>		
10	Final exam		1	2
Number of Weeks /and Units Per Semester			16	32

## VI. : Teaching Strategies of the Course:

### (A) (Knowledge and Understanding)

- Lectures and Groups discussion.
- Self – learning

### (B) (Intellectual Skills)

- Dialogue and discussion
- solving Problem

### (C) (Professional and Practical Skills)

- Lectures
- Simulation & presentations

### (D) (Transferable Skills)

- Self – learning
- Cooperative learning

## VII. Assessment Methods of the Course:

### (A) (Knowledge and Understanding)

- Quizzes, Presentation and Written exam.

### (B) (Intellectual Skills)

- Quizzes, Homework

### (C) (Professional and Practical Skills)

- Performance, Report

### (D) (Transferable Skills)

### Course Specification of: Biopharmaceutics & Pharmacokinetics 1 Code. (PH1124174)

- Homework's evaluation.
- Evaluation of Research reports

### VIII. Assignments:

No.	Assignments	Week Due	Mark
1	Assignment 1: Attendance	1-14	10
2	Assignment 2: Homework, Research & Quizzes.	6&12	10
<b>Total</b>			<b>20</b>

### IX. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments	1-14	20	20%
2	Mid-Term Theoretical Exam	8	30	30%
5	Final Theoretical Exam	16	50	50%
<b>Total</b>			<b>100</b>	<b>100%</b>

### X. Learning Resources:

- Written in the following order: Author, Year of publication, Title, Edition, Place of publication, Publisher.

#### 1- Required Textbook(s) (maximum two ):

Leon Shargel Andrew (2012). Applied Biopharmaceutics and Pharmacokinetics, Sixth edition, Lippincott's and William, Philadelphia

#### 2- Essential References:

- 1- Michel E. Winter (2011). Basic clinical pharmacokinetics, Fifth edition, Lippincott's and William, San Fransisco.

#### Websites:

[www.boomer.org](http://www.boomer.org)

#### Course Specification of: Biopharmaceutics & Pharmacokinetics 1 Code. (PH1124174)

Prepared by:

Reviewed by:

Head of the Department:

Dean of Faculty:

Dean of Center of Development and Quality assurance:



## XI. Course Policies: (Based on the Uniform Students' Bylaw (2007))

1	<b>Class Attendance:</b> Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	<b>Tardiness:</b> A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	<b>Exam Attendance/Punctuality:</b> No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	<b>Assignments &amp; Projects:</b> Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	<b>Cheating:</b> Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	<b>Forgery and Impersonation:</b> Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	<b>Other policies:</b> The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.

## Course Specification Medicinal Chemistry II

I. Course Identification and General Information:						
١	<b>Course Title:</b>	Medicinal Chemistry II				
٢	<b>Course Code &amp; Number:</b>	PH1124137				
٣	<b>Credit hours:</b>	C.H			TOTAL	
		Th.	Seminar	Pr	Tr.	Credit Hours
		2		1		3
٤	<b>Study level/ semester at which this course is offered:</b>	Level 4 / 1 <sup>st</sup> Semester				
٥	<b>Pre –requisite (if any):</b>	Pharmaceutical Organic Chemistry I, II, and III, Pharmacology II				
٦	<b>Co –requisite (if any):</b>					
٨	<b>Program (s) in which the course is offered:</b>	Pharmacy				
٩	<b>Language of teaching the course:</b>	English				
١٠	<b>Location of teaching the course:</b>	Faculty of Medical Sciences				
11	<b>Prepared By:</b>	Assistant Prof. Dr. Sam Dawbaa				
12	<b>Date of Approval</b>					

## II. Course Description:

This course aims to provide the students with basic knowledge about classification, mechanism of action, chemical properties, structure-activity relationships, metabolism, and chemical synthesis of drugs used in the treatment of diseases of the central nervous and endocrine systems, in addition to narcotic analgesics, nonsteroidal anti-inflammatory drugs, and vitamins.

## III. Course Objectives:

1. To provide the student with basic knowledge regarding the chemical properties and SARs and their contribution to the biological activity of drugs used in the treatment of diseases of the central nervous and endocrine systems.
2. To provide the student with basic knowledge regarding the chemical properties and SARs and their contribution to the biological activity of opioid analgesics, opioid antagonists, nonsteroidal anti-inflammatory drugs, and vitamins.
3. To explain some methods of chemical synthesis of selected drugs.
4. To compare between classes of drugs in each system.
5. To explain the metabolic pathways of those drugs.

#### IV. Course Intended Learning Outcomes (CILOs) :

##### Knowledge and Understanding:

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

Knowledge and Understanding PILOs	Knowledge and Understanding CILOs	Teaching Strategies
After completing this program, students would be able to:	After completing this course, students would be able to:	Lectures, Discussions, Self-learning.
A1 Explain the relationship between the structural activity relationship (SAR) and its pharmacokinetics and pharmacological activity.	a1: Explain the structure-activity relationship (SAR) of the drugs of the central nervous and endocrine systems. In addition to opioid analgesics, nonsteroidal anti-inflammatory drugs, and vitamins	Lectures, Discussions, Self-learning.
A2 Understand the chemistry of drug-receptor interaction.	a2: <ul style="list-style-type: none"> <li>Discuss the relationship between chemical properties and drug activity.</li> <li>Discuss methods of chemical synthesis of selected drugs.</li> </ul>	Lectures, Discussions, Self-learning.
A3: Understand the metabolic pathways of drugs in the body.	a3: <ul style="list-style-type: none"> <li>Explain the metabolism of drugs used in their respective systems.</li> </ul>	Lectures, Discussions, Self-learning.

##### Intellectual Skills :

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

Intellectual Skills PILOs	Intellectual Skills CILOs	Teaching Strategies
After completing this program, students would be able to:	After completing this course, students would be able to:	The following strategies should be used:
B1 Discuss the structure activity relationships (SAR) that control the pharmacokinetics and pharmacodynamics	b1: Identify the structural features of drugs responsible for their therapeutic and adverse effects.	Lectures, Discussions, Seminars, Self-learning.
	b2: Predict the pharmacokinetics of drugs based on their physicochemical	Lectures, Discussions, Seminars, Self-learning.

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

### **Transferable (General) Skills :**

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

<b>Transferable (General) Skills PILOs</b>	<b>Transferable (General) Skills CILOs</b>	<b>Teaching Strategies</b>
After completing this program, students would be able to:	After completing this course, students would be able to:	The following strategies should be used:
D1 Use chemistry-related softwares and search efficiently for medical information from professional medical sites.	d1: To use famous websites used in medicinal chemistry research including SwissADME, ChemBL, PubChem, Siencedirect, and Google Scholar. d2: Use important software such as ChemDraw, ChemSketch, and has	Discussions, Presentations, Self-learning.

	some knowledge about Molecular Docking software.	
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## V. Course Content:

### A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Chemistry of drugs used in the treatment of central nervous system diseases	<ul style="list-style-type: none"> <li>Sedative and hypnotic agents: Classes, MOA, uses, adverse effects, chemical properties, SARs, chemical synthesis, metabolism, and pharmacokinetics.</li> </ul>	2	4	a1, a2, a3, b1, b2, d1, d2
		<ul style="list-style-type: none"> <li>Antipsychotic and Antidepressant agents: Classes, MOA, uses, adverse effects, chemical properties, SARs, chemical synthesis, metabolism, and pharmacokinetics.</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2
		<ul style="list-style-type: none"> <li>Anticonvulsant agents: Classes, MOA, uses, adverse effects, chemical properties, SARs, chemical synthesis, metabolism, and pharmacokinetics.</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2
		<ul style="list-style-type: none"> <li>General and local anaesthetics: Classes, MOA, uses, adverse effects, chemical properties, chemical synthesis, metabolism, and pharmacokinetics.</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2
2	Narcotic analgesics	<ul style="list-style-type: none"> <li>Opiates and opioid antagonists: Classes, MOA, uses, adverse effects, chemical properties, SARs, chemical synthesis, metabolism, and pharmacokinetics.</li> </ul>	2	4	a1, a2, a3, b1, b2, d1, d2
	Mid-Term	Mid-term Exam	1	2	
3	Nonsteroidal anti-inflammatory drugs (NSAIDs)	<ul style="list-style-type: none"> <li>COX-I inhibitors: salicylic acid derivatives, arylacetic acid derivatives, arylpropanoic acid derivatives</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2
		<ul style="list-style-type: none"> <li>COX-I inhibitors: anthranilic acid</li> </ul>	1	2	a1, a2, a3, b1,

		<ul style="list-style-type: none"> <li>derivatives, oxicams, acetaminophen, others.</li> <li>COX-II inhibitors.</li> <li>Chemical synthesis of selected drugs.</li> </ul>			b2, d1, d2
4	Drugs of the endocrine disorders	<ul style="list-style-type: none"> <li>Steroids: chemistry and metabolism of adrenocorticoids, mineralocorticoids, and sex hormones.</li> <li>Oral contraceptives.</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2
		<ul style="list-style-type: none"> <li>Antidiabetic agents: Insulin preparations.</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2
		<ul style="list-style-type: none"> <li>Antidiabetic agents: oral hypoglycaemic agents.</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2
		<ul style="list-style-type: none"> <li>Thyroid hormones, drugs, and antithyroid drugs.</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2
5	Vitamins	<ul style="list-style-type: none"> <li>Chemistry of vitamins</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2
	Final Exam	Final Exam	1	2	
Number of Weeks /and Units Per Semester			16	32	

B – Case Studies and Practical Aspect: (if any)				
Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Introduction: Pharmacopoeia as references for drugs assay	1	2	c1, c2, d1, d2
2	Assay of Sodium Benzoate	1	2	c1, c2, d1, d2
3	Assay of Indomethacin Capsules	1	2	c1, c2, d1, d2
4	Assay of Propranolol Tablets	1	2	c1, c2, d1, d2
5	Assay of Metoprolol Tablets	1	2	c1, c2, d1, d2
6	Assay of Metoprolol Tablets	1	2	c1, c2, d1, d2
7	Titrimetric Assay of Furosemide Tablet	1	2	c1, c2, d1, d2

8	Assay of Metronidazole Tablets	1	2	c1, c2, d1, d2
9	Chemical synthesis of paracetamol (1)	1	2	c1, c2, d1, d2
10	Chemical synthesis of paracetamol (2)	1	2	c1, c2, d1, d2
11	Spectrophotometric Assay of Paracetamol	1	2	c1, c2, d1, d2
12	Chemical synthesis of aspirin	1	2	c1, c2, d1, d2
13	Titrimetric assay of in-lab synthesized aspirin	1	2	c1, c2, d1, d2
14	Titrimetric assay of aspirin tablets	1	2	c1, c2, d1, d2
15	Final Exam	1	2	
<b>Number of Weeks /and Units Per Semester</b>		<b>15</b>	<b>30</b>	

## VI. Teaching strategies of the course:

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

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments (Homework and class discussion activity)	1-12	5	5%	a1,a2,
2	Quiz 1	4	2.5	2.5%	a1,a2, ,b1,b2
3	Mid-semester exam of theoretical part (written exam)	8	10	10%	c1,c2,
4	Quiz 2	12	2.5	2.5%	c1,c2,
5	Lab. Term	1-14	5	5%	c1, c2,d1,d2
6	works		Accomplishments	5	
7	Final exam (practical)	15	20	20%	c1, c2,d1,d2



8	Final exam of theoretical part	16	50	50%	a1,a2,b1,b2,c1, d1,d2
Total			100	100%	

## VIII. Learning Resources:

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

1. Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, 13<sup>th</sup> edition, J. N. Delgado and W. A. Remers, Lippincott, 2017.
2. Foye's Principles of Medicinal Chemistry, 7<sup>th</sup> edition, Thomas L. Lemke and David A. Williams, Lippincott Williams & Wilkins, 2013.

### 2- Essential References.

1. An Introduction to Medicinal Chemistry, 5<sup>th</sup> edition, Graham Patrick, Oxford University Press, 2013.
2. Kar, A. (2007). Advanced practical medicinal chemistry. New Age International.
3. Pedersen, O. (2006). Pharmaceutical Chemical Analysis: Methods for Identification and Limit Tests. Ukraine: CRC Press.

### 3- Electronic Materials and Web Sites *etc.*

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

<https://orgsyn.org/>

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

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

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

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



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



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

## Faculty of Medical Sciences

Department of Pharmacy

Program of Bachelors Pharmacy

## Course Specification of Applied pharmacognosy Course Code. (PH1124146)

2024



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

## I. Course Identification and General Information:

1	Course Title:	<i>Applied pharmacognosy</i>				
2	Course Code & Number:	<b>PH1124146</b>				
3	Credit hours:	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2				2
4	Study level/ semester at which this course is offered:	<i>Fourth level/ 1<sup>st</sup> semester</i>				
5	Pre –requisite (if any):	<i>Pharmacognosy and phytochemistry</i>				
6	Co –requisite (if any):					
7	Program (s) in which the course is offered:	<i>Bachelor of Pharmacy</i>				
8	Language of teaching the course:	<i>English</i>				
9	Study System	<i>Semester</i>				
10	Mode of delivery:	<i>Regular</i>				
11	Location of teaching the course:	<i>Faculty of Medical Sciences, Thamar University</i>				
12	Prepared By:	<i>Dr. Abdulkarim Kassem Alzomor Dr. Aref Aiz Aldeen Al-Senway</i>				
13	Date of Approval					

## II. Course Description:

This course will provide the fundamental principles used to understanding, knowledge and identification of crude drug (medicinal plant) ,methods of identification by use chemical, physical ,macroscopical ,microscopical and chromatographic methods . Topics to be covered will include general properties, biosynthesis origin, structure activity, methods of extraction and isolation and elucidation methods.

### Course Specification of: Applied pharmacognosy Code. (PH1124146)

### III. Intended learning outcomes (ILOs)

Course Intended Learning Outcomes		Program Intended Learning Outcomes	
<b>a1</b>	Know the basic principles of drugs derived plants and the effect of active constituents on the health	<b>A1</b>	knows the basic principles of pharmaceutical, medical, health & environmental sciences, as well as, pharmaceutical calculations.
<b>a2</b>	Sufficiently know of the analytical techniques ,necessary for extraction ,isolation ,and quality control.	<b>A2</b>	Sufficiently knows of the analytical & biotechnical techniques, necessary for isolation, refinement, analysis& titration& manufacturing of pharmaceutical substances & preparations
<b>a3</b>	Identify the physical-chemical properties of crude drug to determine the purity of crude drug.	<b>A4</b>	High accuracy identifies the physical & chemical properties & the toxic effects of various materials used in the preparation of medicines whether effective & ineffective.
<b>a4</b>	Choose the correctly methods of extraction of active constituents from the medical plants.	<b>A7</b>	Correctly Choose of the ways of extraction of effective substances from the medical plants & the principles of alternative treatment.
<b>b1</b>	Choose of the appropriate methods to extraction, isolation ,purification ,and formulation of active substances from plants.	<b>B1</b>	Correctly choose of the appropriate methods to isolate & purification and titration accurately of active substances from different sources according to the standards and policy of medicines.
<b>c1</b>	Extract the active substances from their source by correct scientific methods.	<b>C3</b>	Extract the active substances from their various sources by correct scientific methods whether in their isolation , purification, titration and preparation.
<b>d1</b>	Work effectively with a team	<b>D1</b>	Works effectively in a unique team.
<b>d2</b>	Correctly use the technology ,information ,programs of computer	<b>D4</b>	Resides excellent relationships with the patients & related healthcare directions.

#### Course Specification of: Applied pharmacognosy Code. (PH1124146)

<b>(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:</b>		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
<p><b>a1-</b> Know the basic principles of drugs derived plants and the effect of active constituents on the health</p> <p><b>a2-</b> Sufficiently know of the analytical techniques ,necessary for extraction ,isolation ,and quality control.</p> <p><b>a3-</b> Identify the physical-chemical properties of crude drug to determine the purity of crude drug.</p> <p><b>a4-</b> Choose the correctly methods of extraction of active constituents from the medical plants.</p>	<ul style="list-style-type: none"> <li>- Lectures and Groups discussion.</li> <li>- Practical presentations</li> <li>- Self - learning.</li> </ul>	Quizzes, Written exam.

<b>(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:</b>		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
<p><b>b1.</b> Choose of the appropriate methods to extraction, isolation ,purification ,and formulation of active substances from plants.</p>	<ul style="list-style-type: none"> <li>- Discussions and Training</li> <li>- Field visits</li> <li>- Problem solving</li> </ul>	<ul style="list-style-type: none"> <li>- Quizzes, Homework</li> <li>- Observation</li> <li>- Task's Evaluates</li> </ul>

<b>(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:</b>		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies

c2. Extract the active substances from their source by correct scientific methods.	- Discussions and Training - Field visits - Problem solving	- Quizzes, Homework - Observation - Task's Evaluates
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<b>(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:</b>		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Work effectively with a team	- Group discussions - Cooperative learning.	- Homework - Evaluates of Oral Presentation
d2. Correctly use the technology, information, programs of computer	- Self – learning - Inductive and deductive	

<b>IV. Course Content:</b>					
<b>A – Theoretical Aspect:</b>					
Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1	<b>Introduction To applied pharmacognosy</b>	a1, a2,a3,a4, b1, c1,d1,d2	Definitions and brief history of applied pharmacognosy and general concepts of applied pharmacognosy	1	2
2	<b>Organoleptic methods</b>	a1, a2,a3,a4, b1, c1,d1,d2	<b>Macroscopic evaluation of different organs of the plants</b> Leaf, flowers ,stems ,barks ,herbs, seeds and roots and rhizomes ,	1	2

**Course Specification of: Applied pharmacognosy Code. (PH1124146)**

3	Microscopic methods	a1, a2,a3,a4, b1, c1,d1,d2	Evaluation of crude drug by used : Key elements such as : stomata ,trichomes ,starch ,Ca-oxalte ,phloem and fiber . Stomata index Vien-islet number Lycopodium spore methods	2	4
4	Physical and chemical methods	a1, a2,a3,a4, b1, c1,d1,d2	Definition; physical parameters influence the purity of crude drug: Moisture ,melting point ,optical rotation ,etc. Chemical evaluation by chemical test	1	2
5	Chromatographic methods	a1, a2,a3,a4, b1, c1,d1,d2	Definition of chromatographic ,types of chromatographic ,mechanism of action TLC chromatography	1	2
6	HPLC	a1, a2,a3,a4, b1, c1,d1,d2	Definition, composition ,mechanism of action and applications	1	2
7	Mid-term Exam			1	2
8	GC	a1, a2,a3,a4, b1, c1,d1,d2	Definition, General characters ,composition , mechanism of action ,applications	2	4
9	Spectroscopic methods	a1, a2,a3,a4, b1, c1,d1,d2	Definition, General characters, Types, mechanism of action and applications	1	2
10	Biological evaluation	a1, a2,a3,a4, b1, c1,d1,d2	Definition , general characters, Evaluation of hypoglycemic herbl drugs .	2	4
11	Biological evaluation	a1, a2,a3,a4, b1, c1,d1,d2	Evaluation of anti-	1	

**Course Specification of: Applied pharmacognosy Code. (PH1124146)**

			<b>inflammatory action ,evaluation of anti ulcer herb drug ,evaluation of anti- oxidants drugs</b>		2
11	Course Review	a1, a2,a3,a4, b1, c1,d1,d2	Review of the course topics by discussion session.	1	2
12	FINAL - EXAM			1	2
<b>Number of Weeks /and Units Per Semester</b>				<b>16</b>	<b>32</b>

## V. Teaching strategies of the course:

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

## VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Class attendance and participation	a1, a2,a3,a4, b1, c1,d1,d2	weekly	5
2	Homework, presentation	a1, a2,a3,a4, b1, c1,d1,d2	11	5

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

No.	Assessment Method	Week Due	Mark	Proportion of Final	Aligned Course Learning
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### Course Specification of: Applied pharmacognosy Code. (PH1124146)



				Assessment	Outcomes
1	Assignments	1-14	10	10%	a1, a2,a3,a4, b1, c1,d1,d2
2	Quizzes 1	6	5	5%	a1, a2,a3,a4, b1, c1,d1,d2
3	Mid-semester exam of theoretical part ( written exam	8	20	20%	a1, a2,a3,a4, b1, c1,d1,d2
4	Quizzes 2	12	5	5%	a1, a2,a3,a4, b1, c1,d1,d2
5	Final exam of theoretical part ( written exam)	16	60	60%	a1, a2,a3,a4, b1, c1,d1,d2
<b>Total</b>			100	100%	

## VIII. Learning Resources

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

1. Treas and Evans, 2009, Text book of Pharmacognosy, 16<sup>th</sup> Edition, Tornoto, Elseiver publication.
- 2-Qadaray , 2005, Text book of phytochemistry and phytotherapy , 5<sup>th</sup> edition, India Rakshan

### 2- Essential References.

- 1-Biren N shah, 2010, Pharmacognosy and phytochemistry, 1st edition, India ,Elsevier publication
- 2- Ashutosh kar , 2007, Pharmacognosy and phytochemistry, 2nd edition, Delhi, India New age International Publication ISBN 13 9788122429152.

### 3- Electronic Materials and Web Sites etc.

## IX.Course Policies:

1.	<b>Class Attendance:</b> At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	<b>Tardy:</b> any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	<b>Exam Attendance/Punctuality:</b> any student who is late for more than 30 minutes from starting the exam will not be allowed to

### Course Specification of: Applied pharmacognosy Code. (PH1124146)

	attend the exam and will be considered absent.
4.	<b>Assignments &amp; Projects:</b> Assignments and projects will be assessed individually unless the teacher request for group work
5	<b>Cheating:</b> Cheating by any means will cause the student failure and he/she must re-study the course
6	<b>Plagiarism:</b> Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

## Faculty of Medical Sciences

Department of Pharmacy

Program of Bachelors Pharmacy

## Course Plan (Syllabus) of Applied pharmacognosy Course Code. PH1124146

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

2024

I. Course Identification and General Information:					
1-	Course Title:	<i>Applied pharmacognosy</i>			
2-	Course Number & Code:	PH1124146			
3-	Credit hours:	C.H			Total
		Th.	Seminar	Pr.	
		٢			2
4-	Study level/year at which this course is offered:	<i>Fourth level / 1<sup>st</sup> semester</i>			
5-	Pre –requisite (if any):	<b>Pharmacognosy and phytochemistry</b>			
6-	Co –requisite (if any):				
7-	Program (s) in which the course is offered	<i>General Pharmacy and PharmD</i>			
8-	Language of teaching the course:	<i>English /Arabic</i>			
9-	System of Study:	<i>Semester</i>			
10-	Mode of delivery:	<i>Regular</i>			
11-	Location of teaching the course:	<i>Themar University campus</i>			

II. Course Description:
<p>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).</p>

**Course Specification of: Applied pharmacognosy Code. (PH1124146)**

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

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

- a1-** Know the basic principles of drugs derived plants and the effect of active constituents on the health
- a2-** Sufficiently know of the analytical techniques ,necessary for extraction ,isolation ,and quality control.
- a3-** Identify the physical-chemical properties of crude drug to determine the purity of crude drug.
- a4-** Choose the correctly methods of extraction of active constituents from the medical plants.
- b1.** Choose of the appropriate methods to extraction, isolation ,purification ,and formulation of active substances from plants.
- c2.** Extract the active substances from their source by correct scientific methods.
- d1.** Work effectively with a team
- d2.** Correctly use the technology, information, programs of computer

### IV. Course Content:

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

#### A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours
1	<b>Introduction To applied pharmacognosy</b>	Definitions and brief history of applied pharmacognosy and general concepts of applied pharmacognosy	1	2
2	<b>Organoleptic methods</b>	<b>Macroscopic evaluation of different organs of the plants</b> Leaf ,flowers ,stems ,barks ,herbs, seeds and roots and rhizomes ,	1	2
3	<b>Microscopic methods</b>	<b>Evaluation of crude drug by used :</b> <b>Key elements such as : stomata ,trichomes ,starch ,Ca-oxalte ,phloem and fiber .</b>	2	4

#### Course Specification of: Applied pharmacognosy Code. (PH1124146)

		<b>Stomata index</b> <b>Vien-islet number</b> <b>Lycopodium spore methods</b>		
4	<b>Physical and chemical methods</b>	Definition; physical parameters influence the purity of crude drug: Moisture ,melting point ,optical rotation ,etc. Chemical evaluation by chemical test	1	2
5	<b>Chromatographic methods</b>	Definition of chromatographic ,types of chromatographic ,mechanism of action TLC chromatography and applications	1	2
6	<b>HPLC</b>	Definition, composition ,mechanism of action and applications	1	2
7	Mid-term Exam		1	2
8	<b>GC</b>	Definition, General characters ,composition , mechanism of action ,applications	2	4
9	<b>Spectroscopic methods</b>	Definition, General characters, Types ,mechanism of action and applications	1	2
10	<b>Biological evaluation</b>	Definition ,general characters, Evaluation of hypoglycemic herbl drugs	2	4
11	<b>Biological evaluation</b>	<b>Evaluation of anti-inflammatory action</b> <b>,evaluation of anti ulcer herb drug ,evaluation of anti-oxidants drugs</b>	1	2
11	<b>Course Review</b>	Review of the course topics by discussion session.	1	2
12	Final Exam		1	2
<b>Number of Weeks /and Units Per Semester</b>			<b>16</b>	<b>32</b>

## V. Teaching strategies of the course:

- Lectures
- Groups discussion.

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

## VI. Assignments:

No	Assignments	Week Due	Mark
1	Class attendance and participation	weekly	5
2	Homework, presentation	11	5

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments	1-16	10	10%
2	Quizzes 1	6	5	5%
3	Mid-semester exam of theoretical part ( written exam	8	20	20%
4	Quizzes 2	12	5	5%
5	Final exam of theoretical part ( written exam)	16	60	60%
<b>Total</b>			100	100%

## IX. Learning Resources

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

2. Treas and Evans, 2009, Text book of Pharmacognosy, 16<sup>th</sup> Edition, Tornoto, Elseiver publication.

2-Qadaray , 2005, Text book of phytochemistry and phytotherapy , 5<sup>th</sup> edition, India Rakshan

### Course Specification of: Applied pharmacognosy Code. (PH1124146)

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## 2- Essential References.

- 1-Biren N shah, 2010, Pharmacognosy and phytochemistry, 1st edition, India ,Elsevier publication
- 2- Ashutosh kar , 2007, Pharmacognosy and phytochemistry, 2nd edition, Delhi, India New age International Publication ISBN 13 9788122429152

## 3- Electronic Materials and Web Sites etc.

## X. Course Policies:

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



## Course Specification

### Pharmacology III

I. Course Identification and General Information:					
1	Course Title:	Pharmacology III			
2	Course Code &Number:	PH1124153			
3	Credit hours: 3	C.H			TOTAL
		Th.	Seminar	Pr	
		2	0		0
4	Study level/ semester at which this course is offered:	4 <sup>th</sup> Level / 1 <sup>st</sup> semester			
5	Pre –requisite (if any):	Physiology, Pharmacology 1			
6	Co –requisite (if any):				
7	Program (s) in which the course is offered:	Bachelor of Pharmacy			
8	Language of teaching the course:	English			
9	Location of teaching the course:	Thamar University - Faculty of Medical Sciences			
10	Prepared By:	Dr. Ahmed G. Al- Akydy			
11	Date of Approval	2021			

## II. Course Description:

This course is an extension of pharmacology 2 course. It provides the student with the general knowledge on drugs that affecting cardiovascular, blood, Gastrointestinal, respiratory and renal systems. This course involves agents used in the treatment of hypertension, ischemic heart disease, heart failure, cardiac arrhythmias, dyslipidaemic, haemorrhagic and thromboembolic disorders. In addition to agents used in the treatment anemias, gastrointestinal, respiratory and renal diseases.

## III. Course Objectives:

**The overall aims of the course are:**

1. To raise knowledge of student about commonly used drugs to treat cardiovascular and blood disturbances.
2. To build knowledge about the drugs used in the treatment of peptic ulcer, nausea, vomiting, constipation, bronchial asthma, cough chronic obstructive pulmonary disease.
3. To identify the mechanism, therapeutic uses, side effects/toxicity, contraindications, and interactions of the major classes acting on the cardiovascular, respiratory renal and gastrointestinal systems.

#### 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 major drug categories as they relate to major disorders affecting cardiovascular, such hypertension angina, cardiac arrhythmias, heart failure, dyslipidaemia, thromboembolism and anaemia.

a2 **Enumerate** the different categories of agents that use in the treatment of respiratory, renal and gastrointestinal disorders.

a3 **Explain** in detail the mechanisms of action, therapeutic uses, contraindications and adverse effects of commonly prescribed drugs used in the treatment of cardiovascular, respiratory, gastrointestinal and renal disorders.

Knowledge and Understanding PILOs

Knowledge and Understanding CILOs

After completing this program, students would be able to:

After completing this course, students would be able to:

A1	Explain the fundamentals of general sciences and the basic and biomedical sciences and their relations to pharmacy profession.
A2	Illustrate the fundamentals of social and behavioral sciences relevant to pharmacy, ethics of health care and its impact on their relationship with patients and other healthcare professionals.
A3	Describe relationships between chemical structure of compounds of pharmaceutical and medicinal interest and biological activities

a1 **Describe** the major drug categories as they relate to major disorders affecting cardiovascular, such hypertension angina, cardiac arrhythmias, heart failure, dyslipidaemia, thromboembolism and anaemia.

a2 **Enumerate** the different categories of agents that use in the treatment of respiratory, renal and gastrointestinal disorders.

A4	Define basic principles of drug: target identification, design, informatics, and mechanisms of action	a3	<b>Explain</b> in detail the mechanisms of action, therapeutic uses, contraindications and adverse effects of commonly prescribed drugs used in the treatment of cardiovascular, respiratory, gastrointestinal and renal disorders.
A5	Outline principles of clinical pharmacology, therapeutics and Pharmacovigilance.		

### Intellectual Skills :

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

**b1 Compare between** the different categories of drugs used in the treatment hypertension, angina, bronchial asthma, and renal and gastrointestinal disorders, based on their mechanism of action, pharmacological effects, therapeutic uses, adverse effects and contraindications.

**b2 Design** a proper management strategy, including the appropriate dose, route of administration, and duration of therapy, for patients with various clinical situations of cardiovascular, gastrointestinal, renal and respiratory diseases.

**b3 Evaluate** and resolve the common serious problems, as toxicity, drug interactions, related to medications used in the treatment of cardiovascular, gastrointestinal, renal and respiratory diseases.

#### Intellectual Skills PILOs

#### Intellectual Skills CILOs

After completing this program, students would be able to:

After completing this course, students would be able to:

**B1** Classify the synthetic and natural drugs according to their mechanism of action, systemic effect, therapeutic uses, contraindication and toxicity

**b1** **Compare between** the different categories of drugs used in the treatment hypertension, angina, bronchial asthma, and renal and gastrointestinal disorders, based on their mechanism of action, pharmacological effects, therapeutic uses, adverse effects and contraindications.

B2	Design risk reduction strategies to ensure patient safety and prevent medication errors, drug interaction, and adverse drug effects,		
B3	Solve problems to reduce drug therapy problems	b3	<b>Evaluate</b> and resolve the common serious problems, as toxicity, drug interactions, related to medications used in the treatment of cardiovascular, gastrointestinal, renal and respiratory diseases.
B4	Select drug therapy regimen using mathematical, genomic, clinical pharmacokinetic and pharmacodynamics principles for optimizing the patient therapy and medication safety	b2	<b>Design</b> a proper management strategy, including the appropriate dose, route of administration, and duration of therapy, for patients with various clinical situations of cardiovascular, gastrointestinal, renal and respiratory diseases.

### Professional and Practical Skills

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

c1 **Apply** knowledge with principles of pharmacology to calculate appropriate dosages and regimen of drugs that are used in the treatment of different states of cardiovascular, respiratory, gastrointestinal, and renal disorders.

c2 **Write** a prescription in legal, and correct manner, of the medications **that use to manage** various clinical conditions of cardiovascular, respiratory, gastrointestinal, and renal diseases.

c3 **Detect** and manage problems, such as, side effects and drug interactions, related to drugs that are used in the treatment of cardiovascular, respiratory, gastrointestinal, and renal diseases.

#### Professional and Practical Skills PILOs

#### Professional and Practical Skills CILOs

After completing this program, students would be able to:

After completing this course, students would be able to:

C1 Handle the chemical, biological, and pharmaceutical materials safely

C2 Operate different pharmaceutical equipment and instruments

C3 Extract active substances from different sources.

C4 Carry outpatient physical assessment.

c1 **Apply** knowledge with principles of pharmacology to calculate appropriate dosages and regimen of drugs that are used in

			the treatment of different states of cardiovascular, respiratory, gastrointestinal, and renal disorders.
C5	Advise the patients and health care professionals for optimizing medicines use.	c2	<b>Write</b> a prescription in legal, and correct manner, of the medications <b>that use to manage</b> various clinical conditions of cardiovascular, respiratory, gastrointestinal, and renal diseases.
		c3	<b>Detect</b> and manage problems, such as, side effects and drug interactions, related to drugs that are used in the treatment of cardiovascular, respiratory, gastrointestinal, and renal diseases.

### Transferable (General) Skills :

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)			
<p><b>d1 Present</b> the medical information in written, verbal and electronic forms during the course study</p> <p><b>d2 Work</b> independently and together with colleagues, while considering high ethical standards</p> <p><b>d3 Effectively manage</b> time and learn continuously</p>			
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:	
<b>D1</b>	Communicate effectively and ethically with patients, public, and health care professionals.	<b>d2</b>	<b>Work</b> independently and together with colleagues, while considering high ethical standards
<b>D2</b>	Use information systems and computer softwares in order to enhance the delivery of pharmaceutical care,	<b>d1</b>	<b>Present</b> the medical information in written, verbal and electronic forms during the course study
<b>D3</b>	Work effectively individually and in a team	<b>d2</b>	<b>Work</b> independently and together with colleagues, while considering high ethical standards.
<b>D4</b>	Have the skills of decision-making and time management and lifelong learning	<b>d3</b>	Effectively <b>manage</b> time and learn continuously

## 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 <b>Describe</b> the major drug categories as they relate to major disorders affecting cardiovascular, such hypertension angina, cardiac arrhythmias, heart failure, dyslipidaemia, thromboembolism and anaemia.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Discussion Sessions</li> <li>Assignments</li> </ul>	<ul style="list-style-type: none"> <li>Periodic exam (Quizzes)</li> <li>Evaluate assignments</li> <li>Mid &amp; final exam</li> </ul>
a2 <b>Enumerate</b> the different categories of agents that use in the treatment of respiratory, and gastrointestinal disorders.		
a3 <b>Explain</b> in detail the mechanisms of action, therapeutic uses, contraindications and adverse effects of commonly prescribed drugs used in the treatment of cardiovascular, respiratory, gastrointestinal and renal disorders.		

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1 <b>Compare</b> between the different categories of drugs used in the treatment hypertension, angina, bronchial asthma, and renal and gastrointestinal disorders, based on their mechanism of action, pharmacological effects, therapeutic uses, adverse effects and contraindications.	<ul style="list-style-type: none"> <li>Discussion Sessions</li> <li>Problem solving</li> <li>Group discussion</li> <li>Assignments</li> </ul>	<ul style="list-style-type: none"> <li>Oral presentations</li> <li>Evaluate assignments</li> <li>Mid &amp; final exam</li> </ul>
b2 <b>Design</b> a proper management strategy, including the appropriate dose, route		

	of administration, and duration of therapy, for patients with various clinical situations of cardiovascular, gastrointestinal, renal and respiratory diseases.		
b3	<b>Evaluate</b> and resolve the common serious problems, as toxicity, drug interactions, related to medications used in the treatment of cardiovascular, gastrointestinal, renal and respiratory diseases.		

<b>(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:</b>			
Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
c1	<b>Apply</b> knowledge with principles of pharmacology to calculate appropriate dosages and regimen of drugs that are used in the treatment of different states of cardiovascular, respiratory, gastrointestinal, and renal disorders.	<ul style="list-style-type: none"> <li>• Discussion sessions</li> <li>• Assignments</li> </ul>	<ul style="list-style-type: none"> <li>• Oral presentations</li> <li>• Theory &amp; Practical exams</li> <li>• LAB report</li> <li>• Evaluate assignments</li> </ul>
c2	<b>Write</b> a prescription in legal, and correct manner, of the medications <b>that use to manage</b> various clinical conditions of cardiovascular, respiratory, gastrointestinal, and renal diseases.		
c3	<b>Detect</b> and manage problems, such as, side effects and drug interactions, related to drugs that are used in the treatment of cardiovascular, respiratory, gastrointestinal, and renal diseases.		
<b>(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:</b>			
Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
d1	<b>Present</b> the medical information in written, verbal and electronic forms during the	<ul style="list-style-type: none"> <li>• Discussion Sessions</li> </ul>	<ul style="list-style-type: none"> <li>• Oral presentations</li> </ul>



	course study.	<ul style="list-style-type: none"><li>• Assignments that require collecting information from the internet.</li></ul>	<ul style="list-style-type: none"><li>• Writing</li></ul>
d2	<b>Work</b> independently and together with colleagues, while considering high ethical standards.		
d3	Effectively <b>manage</b> time and learn continuously.		

## V. Course Content:

### A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Cardiovascular System (C.V.S)	- Diuretics	1W	2	a2; a3; b2; b3; c1; c2; c3; d3; d1
		- Antihypertensive drugs	1W		a1; a3; b1; b2; b3; c1; c2; c3; d1; d2
		- Drugs used for ischemic heart disease (angina and myocardial infarction)	1W	2	a1; a3; b1; b2; b3; c1; c2; c3; c4; d1; d2
		- Drugs used in treatment of heart failure.	1W	2	a1; a3; b1; b2; b3; c1; c2; c3; d1; d2
		- Antiarrhythmics	1W	2	a1; a3; b1; b2; b3; c1; c2; c3; d1; d2
2	Blood	- Drugs used in anemia - Plasma expanders	1W	2	a1; a3; b1; b2; b3; c1; c2; c3; d1; d2
		- Coagulants, anticoagulants & thrombolytics. - Haemostatics	1W	2	a1; a3; b1; b2; b3; c1; c2; c3; d1; d2
		- Drugs used in dyslipidemia - Drugs used in gout	1W	2	a1; a3; b1; b2; b3; c1; c2; c3; d1;

					d2
3	Gastrointestinal System	- Emetics and antiemetic drugs	1W	2	a2; a3; b1; b2; b3; c1; c2; c3; d1; d2
		- Liver disease and gallstones - Antidiarrheal and laxatives drugs	1W	2	a2; a3; b1; b2; b3; c1; c2; c3; d1; d2
		- Antiulcer and antacid drugs	1W	2	a2; a3; b1; b2; b3; c1; c2; c3; d1; d2
		- Inflammatory bowel disease (IBD). - Digestant, appetizer and anorexigenic drugs	1W	2	a2; a3; b1; b2; b3; c1; c2; c3; d1; d2
4	Respiratory system	- Drugs used for bronchial asthma and COPD	1W	2	a2; a3; b1; b2; b3; c1; c2; c3; d1; d2
		- Cough therapy	1W	2	a2; a3; b1; b2; b3; c1; c2; c3; d1; d2
<b>Number of Weeks /and Units Per Semester</b>			<b>14</b>	<b>28</b>	

<b>B – Case Studies and Practical Aspect: (if any)</b>				
Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	- Introduction - Diuretics application on rabbit or rats	1	1	c1
2	- Study the analgesic effect of opioid drugs in mice using the tail-flick method	1	1	c1; c3
3	- Study the analgesic effect of opioid drugs in mice using hot plate method	1	1	c1; c3
4	- Study the analgesic effect of opioid drugs against acetic acid-induced writhing in mice	1	1	c1; c3
5	- Study the effect of pentobarbital on righting reflex	1	1	c1; c3
6	- Study the anticonvulsant property of phenobarbital against strychnine-induced convulsions in rats	1	1	c1, c3; c4
7	- Study the muscle relaxant property of diazepam in mice using rotarod apparatus	1	1	c1; c3
8	- Study the anticonvulsant property of diazepam against pentylenetetrazol-induced convulsions in rats	1	1	c1; c3; c4

9	Study of general anesthesia	1	1	c1; c3
10	Study of local anesthesia	1	1	c1; c3
11	Local anesthetics	1	1	c1; c3
12	Review	1	1	c2; c3; c4
<b>Number of Weeks /and Units Per Semester</b>		<b>12</b>	<b>12</b>	

## VI. Teaching strategies of the course:

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

## V. Assignments:

No	Assignments	Mark	Week Due	Aligned CILOs(symbols)
1	Participation	2.5	Weekly	a1; a2; a3; b1; b2;c1; c2; c3; d1; d2
2	Quizzes	2.5	Weekly	a1; a2; a3; b1; b2;c1; c3
3	Research	2.5	6 <sup>th</sup> W	a1; a3; b1; b2; b3; c3; d1; d2; d3

4	Assignments	2.5	6 <sup>th</sup> W	a1; a2; a3; b1; b2;c1;c2; d1; d2
5	Mid – Exam (theoretical)	10	7 <sup>th</sup> W	a1; a2; a3; b1; b2;c1;c3
6	Final Exam (practical)	30	15 <sup>th</sup> W	a1; a3; b1; b2;c1; c2;c3
	<b>Total score</b>	<b>50%</b>		

### VI. 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;c3; d1; d2
2	Quizzes	W6	2.5	2.5%	a1; a2; a3; b1; b2;c1; c3
3	Mid-Term exam	W8	10	10%	a1; a2; a3; b1; b2; c1; c3
4	Practical reports	W12	2.5	2.5%	a1; b3; c2; c3; d1; d2
5	Final exam practical	W 15	30	30%	a1; a3; b1; b2;c1; c2;c3
6	Final Exam theory	W16	50	50%	a1; a2; a3; b1; b2; c1; c3
<b>Total</b>			<b>100</b>	<b>100%</b>	

## VII. Learning Resources:

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

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

- 1) Katzung B.G., Trevor A.J., (2015). Basic & Clinical Pharmacology(13Ed); McGraw-Hill Education, New York.
- 2) Whalen K.; Feild C., Radhakrishnan R.(2019). Lippincott Illustrated Reviews Pharmacology, (7Ed). Wolters Kluwer, New York.

### 2- Essential References.

- 1) Ritter J.M., Flower R., Henderson G., Loke Y.K., Mac Ewan D. (2020). Rang and Dale's Pharmacology (9 Ed). Elsevier Ltd, United Kingdom.
- 2) Brunton L.L., Chabner B.A., Knollmann B.C. ( 2011). Goodman & Gilman's The Pharmacological Basis of Therapeutics (12 Ed). McGraw-Hill companies, Inc. New York.

### 3- Electronic Materials and Web Sites etc.

- <http://www.jpharmacol.com>
- <http://www.cvpharmacology.com>
- <http://www.fda.gov>

## Course Specification of **Pharmacy Practice I**

I. Course Identification and General Information:						
١	<b>Course Title:</b>	Pharmacy Practice I				
٢	<b>Course Code &amp; Number:</b>	PH1124155				
٣	<b>Credit hours:</b>	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		0		2		2
٤	<b>Study level/ semester at which this course is offered:</b>	4 <sup>th</sup> Level / 1 <sup>st</sup> Semester				
٥	<b>Pre –requisite (if any):</b>					
٦	<b>Co –requisite (if any):</b>					
٨	<b>Program (s) in which the course is offered:</b>	Bachelor of Pharmacy				
٩	<b>Language of teaching the course:</b>	English				
١٠	<b>Location of teaching the course:</b>	Thamar University - Faculty of Medical Sciences				
11	<b>Prepared By:</b>					
12	<b>Date of Approval</b>					

### II. Course Description:

This course provides the student with knowledge the basic principles of pharmacy practice. It focus on institutional and community pharmacy practices, the provision not only of the drug required but also the necessary services (before, during or after treatment) to assure optimally safe and effective therapy, handle drug prescriptions , OTC drugs. Also describing and defining the disease pathophysiology and the appropriate therapeutic interventions and information required to treat different systemic diseases, as GI, respiratory CNS disorders, as well as, some infestations.



### III. Course Objectives:

1. To Know the basic skills of pharmacy practice
2. To differentiate between prescription and the non-prescription drugs (OTC), and errors in prescription.
3. To learn the applications of drugs in the treatment of different diseases

### I. Course Intended Learning Outcomes (CILOs) :

#### Knowledge and Understanding:

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

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

- a1. Understand the basic principles of pharmacy practice and its and the different services in the community and hospital levels.
- a2, Describe the role of the pharmacist in counseling of patients and other health care providers for effective and safe use of prescribing and OTC drugs in the community and hospital setting,.
- a3. Explain the application of drugs in the treatment of various diseases and know drug related problems and how manage them.

#### 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	Understand the basic principles of pharmacy practice and its and the different services in the community and hospital levels.
A2	Illustrate the fundamentals of social and behavioral sciences relevant to pharmacy, ethics of health care and its impact on their relationship with patients and other healthcare professionals.	a2	Describe the role of the pharmacist in counseling of patients and other health care providers for effective and safe use of prescribing and OTC drugs in the community and hospital setting,.
A3	Describe relationships between chemical structure of compounds of pharmaceutical and medicinal interest and biological activities		
A4	Define basic principles of drug: target identification, design, informatics, and mechanisms		

	of action		
A5	Outline principles of clinical pharmacology, therapeutics and Pharmacovigilance.	a3	Explain the application of drugs in the treatment of various diseases and know drug related problems and how manage them.

### Intellectual Skills :

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

b1. Predict possible drug interactions and other prescription related problems to ensure their safety use in the treatment of GI, respiratory, CNS and infestations diseases in both community and hospital setting.

b2. Select the proper strategies using principles of pharmacy practice as, clinical pharmacokinetic and pharmacodynamics principles, for presenting effective and safe treatment for patients with disorders related GI, respiratory, and CN systems

b3. Interpret patient leaflets and medication prescriptions for patients in both community and hospital setting.

#### Intellectual Skills PILOs

#### Intellectual Skills CILOs

After completing this program, students would be able to:

After completing this course, students would be able to:

<b>B1</b>	Classify the synthetic and natural drugs according to their mechanism of action, systemic effect, therapeutic uses, contraindication and toxicity		
<b>B2</b>	Design risk reduction strategies to ensure patient safety and prevent medication errors, drug interaction, and adverse drug effects,	b1	Predict possible drug interactions and other prescription related problems to ensure their safety use in the treatment of GI, respiratory, CNS and infestations diseases in both community and hospital setting.
<b>B3</b>	Solve problems to reduce drug therapy problems	b3	Interpret patient leaflets and medication prescriptions for patients in both community and hospital setting.

<b>B4</b>	Select drug therapy regimen using mathematical, genomic, clinical pharmacokinetic and pharmacodynamics principles for optimizing the patient therapy and medication safety	b2	Select the proper strategies using principles of pharmacy practice as, clinical pharmacokinetic and pharmacodynamics principles, for presenting effective and safe treatment for patients with disorders related GI, respiratory, and CN systems
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<b>Professional and Practical Skills</b>			
<b>Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)</b>			
<p>c1. Apply good pharmacy practice in individual management and therapeutic monitoring of drugs used in the treatment of different disorders.</p> <p>c2. Counsel patients about their disease and importance of their safety and correct use of both prescribing and OTC drugs on their health.</p> <p>c3- Utilize the concepts of pharmaceutical care in management of drug related problems.</p>			
<b>Professional and Practical Skills PILOs</b>		<b>Professional and Practical Skills CILOs</b>	
<b>After completing this program, students would be able to:</b>		<b>After completing this course, students would be able to:</b>	
C1	Handle the chemical, biological, and pharmaceutical materials safely		
C2	Operate different pharmaceutical equipment and instruments		
C3	Extract active substances from different sources.		
C4	Carry outpatient physical assessment.		
C5	Advise the patients and health care professionals for optimizing medicines use.	c1	Apply good pharmacy practice in individual management and therapeutic monitoring of drugs used in the treatment of different disorders.

		c2	Counsel patients about their disease and importance of their safety and correct use of both prescribing and OTC drugs on their health.
		c3	Utilize the concepts of pharmaceutical care in management of drug related problems.

**Transferable (General) Skills :**

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

- d1. Interact effectively with patients, the public and health care professionals; including communication, interpretation and presentation of applications of drugs both written and oral
- d2. Advise the patients and other health care professionals about safe and proper use of medicines
- d3, Work effectively in a team in a variety of health care settings.

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:	
<b>D1</b>	Communicate effectively and ethically with patients, public, and health care professionals.	d1	Interact effectively with patients, the public and health care professionals; including communication, interpretation and presentation of applications of drugs both written and oral
<b>D2</b>	Use information systems and computer softwares in order to enhance the delivery of pharmaceutical care,	<b>d2</b>	Advise the patients and other health care professionals about safe and proper use of medicines
<b>D3</b>	Work effectively individually and in a team	<b>d3</b>	Work effectively in a team in a variety of health care settings.
<b>D4</b>	Have the skills of decision-making and time management and lifelong learning		

## II. 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
<b>a1</b> <b>Understand</b> the basic principles of pharmacy practice and its and the different services in the community and hospital levels.	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Discussion Sessions</li> <li>• Assignments</li> </ul>	<ul style="list-style-type: none"> <li>• Periodic exam (Quizzes)</li> <li>• Evaluate assignments</li> <li>• Mid &amp; final exam</li> </ul>
<b>a2</b> <b>Describe</b> the role of the pharmacist in counseling of patients and other health care providers for effective and safe use of prescribing and OTC drugs in the community and hospital setting.		
<b>a3</b> <b>Explain</b> the application of drugs in the treatment of various diseases and know drug related problems and how manage them.		

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
<b>b1</b> <b>Predict</b> possible drug interactions and other prescription related problems to ensure their safety use in the treatment of GI, respiratory, CNS and infestations diseases in both community and hospital setting.	<ul style="list-style-type: none"> <li>• Discussion Sessions</li> <li>• Problem solving</li> <li>• Group discussion</li> <li>• Assignments</li> </ul>	<ul style="list-style-type: none"> <li>• Oral presentations</li> <li>• Evaluate assignments</li> <li>• Mid &amp; final exam</li> </ul>
<b>b2</b> <b>Select</b> the proper strategies using principles of pharmacy practice as, clinical pharmacokinetic and pharmacodynamics principles, for presenting effective and safe		

	treatment for patients with disorders related GI, respiratory, and CN systems		
<b>b3</b>	<b>Interpret</b> patient leaflets and medication prescriptions for patients in both community		

**(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	<b>Apply</b> good pharmacy practice in individual management and therapeutic monitoring of drugs used in the treatment of different disorders.	<ul style="list-style-type: none"> <li>• Discussion sessions</li> <li>• Assignments</li> </ul>	<ul style="list-style-type: none"> <li>• Oral presentations</li> <li>• Theory &amp; Practical exams</li> <li>• LAB report</li> <li>• Evaluate assignments</li> </ul>
c2	<b>Counsel</b> patients about their disease and importance of their safety and correct use of both prescribing and OTC drugs on their health.		
c3	<b>Utilize</b> the concepts of pharmaceutical care in management of drug related problems.		

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

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
d1	<b>Interact</b> effectively with patients, the public and health care professionals; including communication, interpretation and presentation of applications of drugs both written and oral	<ul style="list-style-type: none"> <li>• Discussion Sessions</li> <li>• Assignments that require collecting information from the internet.</li> </ul>	<ul style="list-style-type: none"> <li>• Oral presentations</li> <li>• Writing</li> </ul>
d2	<b>Advice</b> the patients and other health care professionals about safe and proper use of medicines		
d3	<b>Work</b> effectively in a team in a variety of health care settings.		

V. Course Content:					
A – Theoretical Aspect:					
Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Introduction to pharmacy practice	<ul style="list-style-type: none"> <li>- <b>Terminologies and concepts:</b> primary, secondary and tertiary care</li> <li>- <b>Pharmacy Practice:</b> institutional, hospital, ward clinical and community pharmacy</li> <li>- <b>Patients:</b> confidentiality, compliance, counseling, informed consent.</li> <li>- Good Pharmacy Practice (GPP)</li> </ul>	1w	2	a1; a2; b2;
2	Medical prescription	<ul style="list-style-type: none"> <li>- Prescription <b>event</b>-monitoring</li> <li>- Types and sources of medication errors</li> <li>- Risk and its measurement</li> </ul>	1w	2	a2; b1; b3; c2; d1; d2
3	OTC drugs		1w	2	a2; b3; c3; d2
4	Drug - related problems	Drug interaction	1w	2	a3; b1; c3; d2
		Adverse drug effects	1w	2	a3; b1; d2
5	Patient Information Leaflet	<ul style="list-style-type: none"> <li>- Drug orders</li> <li>- Medication Records</li> </ul>	1w	2	a2; a3; b3; d1; d2
6	Patient counseling and education		1w	2	a2; b2; c2; d1; d2
7	Applications and therapeutic considerations in:	<ul style="list-style-type: none"> <li>- GIT disorders: <ul style="list-style-type: none"> <li>o Diarrhea</li> <li>o Constipation</li> <li>o Vomiting</li> <li>o Hemorrhoids</li> </ul> </li> </ul>	1w	2	a3; b1; b2; c1; c3; d3
8	Seminar		1w	2	a2; a3; b1; b3; c1; c3; d1; d3
9	Applications and therapeutic considerations in:	<ul style="list-style-type: none"> <li>- Respiratory diseases <ul style="list-style-type: none"> <li>o Inhaler devices</li> <li>o Common cold</li> <li>o Influenza</li> <li>o Allergic rhinitis</li> </ul> </li> </ul>	1w	2	a3; b1; b2; c1; c3; d3

		○ Cough			
10	Seminar		1w	2	a2; a3; b1; b3; c1; c3; d1; d3
11	Applications and therapeutic considerations in:	- Nervous system disorders ○ Headache ○ Migraine	1w	2	a3; b1; b2; c1; c3; d3
12	Seminar		1w	2	a2; a3; b1; b3; c1; c3; d1; d3
13	Applications and therapeutic considerations in infestations	- Head lice - Scabies - Threadworm	1w	2	a3; b1; b2; c1; c3; d3
<b>Number of Weeks /and Units Per Semester</b>			<b>14</b>	<b>24</b>	

#### VI. Teaching strategies of the course:

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

#### V. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Participation	5	Weekly	a1; a2; a3; b1; b2
2	Quizzes	5	Weekly	a1; a2; a3;



				b1; b2
3	Research	5	6 <sup>th</sup> W	a2; a3; b3; c1; c3; d1; d3
4	Assignments	5	6 <sup>th</sup> W	a2; a3; b2; b3; c1; c2; d3
	Mid – Exam (theoretical)	20	7 <sup>th</sup> W	a1; a2; a3; b1
	<b>Total score</b>	<b>40%</b>		

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments & Homework, Tasks & Presentation	Fortnightly	10	10%	a2; a3; b2; b3; c1; c2; d3
2	Quizzes	<b>W6</b>	5	5%	a1; a2; a3; b1; b2
3	Mid-Term exam	<b>W8</b>	20	20%	a1; a2; a3; b1
4	Practical reports	<b>W12</b>	5	5%	a1; a2; a3; b1;c1;c3
6	Final Exam theory	<b>W16</b>	60	60%	a1; a2; a3; b1
<b>Total</b>			<b>100</b>	<b>100%</b>	

<b>VI. Learning Resources:</b>	
<b>1- Required Textbook(s) ( maximum two ).</b>	
	<ol style="list-style-type: none"><li>1. Mary Anne Koda-Kimble, Lloyd Yee Young, Wayne A Kradjan, B. Joseph Guglielmo, Brian K Alldredge. Applied Therapeutics: The Clinical Use of Drugs. 9th edition. Lippincott Williams &amp; Wilkins, 2004.</li><li>2. A. David Rodrigues Drug-Drug Interactions Second Edition. New Jersey, USA, 2008</li></ol>
<b>2- Essential References.</b>	
	<ol style="list-style-type: none"><li>1. A Practical Guide to Contemporary Pharmacy Practice by Judith E. Thomson, Lippincott Williams &amp; Wilkins</li><li>2. Introduction to Hospital and Health-System Pharmacy Practice by David A. Holdford and Thomas R. Brown</li></ol>
<b>3- Electronic Materials and Web Sites etc.</b>	
	<a href="http://online.lexi.com/lco/action/login">http://online.lexi.com/lco/action/login</a>



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



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

## **Faculty of Medical sciences**

Department of Pharmacy

Program of B. Pharmacy

# **Course Specification of Dermatological & Cosmetic Preparations Course Code. (PH1124277)**

**2024**



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

## I. General Information:

1.	Course Title:	Dermatological & Cosmetic Preparations				
2.	Course Code:	PH1124277				
3.	Course Type:	Compulsory course				
4.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours	
			Lecture	Tutorial/ Seminar	Lab	Clinical
		3	2		1	--
5.	Level/ Semester at which this Course is offered:	4 <sup>th</sup> Level / 1 Semester				
6.	Pre –Requisite (if any):	Pharmaceutics II				
7.	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. Abdulkarim K. Alzomor				
12.	Reviewed By:					
13.	Date and Number of Approval by Council:					

### Course Specification of: Dermatological & Cosmetic Preparations Code. (PH1124277)

Prepared by:

Reviewed by:

Head of the Department:

Dean of Faculty:

Dean of Center of Development  
and Quality assurance:

## II. Course Description:

This course has been designed to provide students with a detailed knowledge and understanding of formulation, preparation and packaging of a different cosmetics preparation. Students will be given thorough knowledge on cosmetics preparation like skin, hair care products, dentifrices, deodorants and makeup preparations.

## III. Course Intended Learning Outcomes (CILOs):

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

Referenced PILOs

A. Knowledge and Understanding:		I, P or M/A	Referenced PILOs	
a1	Explain the formulation and packaging of different cosmetics preparation.	A	A3	Clearly distinguishes the foundations of the design of medicines & their development, using the various equipments and techniques, as well as, the tests that use in the pharmaceutical industry.
a2	Identify the role of different excipients used in cosmetics preparation	A	A4	High accuracy identifies the physical & chemical properties & the toxic effects of various materials used in the preparation of medicines whether effective & ineffective.
B. Intellectual Skills:				
b1	Determine the suitable components for different formulation of cosmetics preparation.	A	B1	Accurately suggests of the correct choice of the drug treatment for various disease conditions according to the foundations of pharmacological therapy.
C. Professional and Practical Skills:				

### Course Specification of: Dermatological & Cosmetic Preparations Code. (PH1124277)

Prepared by:

Reviewed by:

Head of the Department:

Dean of Faculty:

Dean of Center of Development  
and Quality assurance:

c1	Formulate suitable and stable cosmetics preparation.	A	C3	Extract the active substances from their various sources by correct scientific methods whether in their isolation, purification, titration and preparation.
c2	Evaluate pharmaceutical cosmetics preparation	A	C4	Efficiently operates, the different technologies and equipment in the area of pharmacy.

#### D. Transferable Skills:

d1	Perform tasks and costs of the course independently and be able to work as an effective member in a team	A	D1	Works effectively in a unique team.
d2	Employ the technologies services to solve problems of pharmaceutical calculation and develop skills.	A	D2	Correctly uses, the means of the technology, information, programs of computer and the statistical programs, which contribute in raising the health level.

I= Introduced, P=Practiced or M/A= Mastered/Advanced

IV. Alignment of Course Intended Learning Outcomes			
(A) Alignment of Course Intended Learning Outcomes (Knowledge and Understanding) to Teaching Strategies and Assessment Methods:			
	Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
a1	Explain the formulation and packaging of different cosmetics preparation.	<ul style="list-style-type: none"> <li>- Lectures and Groups discussion.</li> <li>- Self – learning</li> </ul>	<ul style="list-style-type: none"> <li>▪ Quizzes, Presentation and Written exam.</li> </ul>
a2	Identify the role of different excipients used in cosmetics preparation		
(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching Strategies and Assessment Methods:			
	Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies

#### Course Specification of: Dermatological & Cosmetic Preparations Code. (PH1124277)

b1	Determine the suitable components for different formulation of cosmetics preparation.	- Dialogue and discussion - solving Problem	- Quizzes, Homework
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**(C) Alignment of Course Intended Learning Outcomes (Professional and Practical Skills) to Teaching Strategies and Assessment Methods:**

Course Intended Learning Outcomes		Teaching Strategies	Assessment Strategies
c1	Formulate suitable and stable cosmetics preparation.	- Lectures - Simulation & presentations	▪ Performance, Report
c2	Evaluate pharmaceutical cosmetics preparation		

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

Course Intended Learning Outcomes		Teaching Strategies	Assessment Strategies
d1	Perform tasks and costs of the course independently and be able to work as an effective member in a team	- Self – learning - Cooperative learning	- Homework's evaluation. ▪ Evaluation of Research reports
d2	Employ the technologies services to solve problems of pharmaceutical calculation and develop skills.		

**V. Course Contents:**

**A. Theoretical Aspect:**

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Introduction	<ul style="list-style-type: none"> <li>Fundamentals of cosmetic science</li> </ul>	1	2	a1, a2, b1, d2
2	Cosmetics for skin	<ul style="list-style-type: none"> <li>Structures and functions of skin</li> <li>Formulation, Preparation and Packaging of                             <ul style="list-style-type: none"> <li>Antiwrinkle preparations</li> </ul> </li> </ul>	5	10	a1, a2, b1, d1, d2

**Course Specification of: Dermatological & Cosmetic Preparations Code. (PH1124277)**

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
		<ul style="list-style-type: none"> <li>and vanishing and emollient creams</li> <li>○ Shaving preparations</li> <li>○ Anti-acne products</li> <li>○ Sunscreen preparations and skin bleaches</li> <li>○ Skin cleansing preparations</li> <li>○ Anti-aging preparation</li> <li>○ Depilatory preparations</li> <li>○ Depigmentation products</li> </ul>			
3	Midterm exam		1	2	a1, a2, b1, d1, d2
4	Cosmetics for hair.	<ul style="list-style-type: none"> <li>• Structures and functions of hair .</li> <li>• Formulation, Preparation and Packaging of <ul style="list-style-type: none"> <li>○ Hair shampoo</li> <li>○ Hair styling/colorant products</li> </ul> </li> </ul>	1	2	a1, a2, b1, d1, d2
5	• Dentifrices	<ul style="list-style-type: none"> <li>• Formulation, Preparation and Packaging of <ul style="list-style-type: none"> <li>○ Toothpaste</li> <li>○ Gel</li> <li>○ Powders</li> </ul> </li> </ul>	2	4	a1, a2, b1, d1, d2
6	Deodorants and antiperspirants	Formulation, Preparation and Packaging of deodorants and antiperspirants	2	4	a1, a2, b1, d1, d2
7	Makeup preparations	<ul style="list-style-type: none"> <li>• Formulation, Preparation and Packaging of <ul style="list-style-type: none"> <li>○ Nail polish</li> <li>○ Lipsticks</li> </ul> </li> <li>• Eye lashes</li> </ul>	3	6	a1, a2, b1, c1, d1, d2
8	Final exam		1	2	a1, a2, b1, c1, d1, d2
<b>Number of Weeks /and Units Per Semester</b>			<b>16</b>	<b>32</b>	



B – Practical Aspect:				
Order	Practical Experiment	Number of weeks	Contact hours	C-ILOs
1	Preparation of Cold cream	1	2	a1, a2, b1, c1, c2, d1, d2
2	Preparation of vanishing cream	1	2	a1, a2, b1, c1, c2, d1, d2
3	Preparation of transparent shampoo	1	2	a1, a2, b1, c1, c2, d1, d2
4	Preparation of egg shampoo	1	2	a1, a2, b1, c1, c2, d1, d2
5	Preparation of hand and body lotion,	1	2	a1, a2, b1, c1, c2, d1, d2
6	Preparation of Shaving cream	1	2	a1, a2, b1, c1, c2, d1, d2
7	Preparation of toothpaste and powder	1	2	a1, a2, b1, c1, c2, d1, d2
8	Preparation of After-shave lotion etc.	1	2	a1, a2, b1, c1, c2, d1, d2
9	Preparation of lipsticks	1	2	a1, a2, b1, c1, c2, d1, d2
10	Quality control of cosmetics products	1	2	a1, a2, b1, c2, d1, d2
	Determination of pH, rinse-ability and sensitivity			
11	Quality control of cosmetics products	2	4	a1, a2, b1, c1, c2, d1, d2
	checking the viscosity and related rheological properties			
12	Quality control of cosmetics products	1	2	a1, a2, b1, c1, c2, d1, d2
	Stability and microbiological aspect			
13	Final exam	1	2	a1, a2, b1, c1, c2, d1, d2
Number of Weeks/and Units Per First semester4			28	

## VI. Assignments:

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	Assignment 1: Attendance	1-14	10	a1, a2, b1, c1, c2 d1, d2
2	Assignment 2: Homework, Research & Quizzes.	6&12	5	a1, a2, b1, c1, c2 d1, d2
<b>Total</b>			<b>15</b>	

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments	1-14	15	15%	a1, a2, b1, c1, c2 d1, d2
2	Mid-Term Theoretical Exam	8	15	15%	a1, a2, b1.
3	Mid-Term Practical Exam	7	10	10%	a2, b1, c1, d1
4	Final Practical Exam including Project Presentation & Evaluation	14	20	20%	a1, a2, b1, c1, c2 d1, d2
5	Final Theoretical Exam	16	40	40%	a1, a2, b1, c1, c2 d1, d2
<b>Total</b>			<b>100</b>	<b>100%</b>	

## VIII. Learning Resources:

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

### 1- Required Textbook(s) (maximum two ):

1. Ralph Gordon Harry and Martin M. Rieger (2000). Harry's Cosmeticology. 8<sup>th</sup> Edition. England.

### 2- Essential References:

1. Balsam and Edward Sagarin(1992). Cosmetics: Science and Technology. Wiley-Interscience, London.

### Websites:

## Course Specification of: Dermatological & Cosmetic Preparations Code. (PH1124277)

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IX. Course Policies: (Based on the Uniform Students' By law (2007))	
1	<b>Class Attendance:</b> Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	<b>Tardiness:</b> A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	<b>Exam Attendance/Punctuality:</b> No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	<b>Assignments &amp; Projects:</b> Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	<b>Cheating:</b> Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	<b>Forgery and Impersonation:</b> Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	<b>Other policies:</b> The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.

## Faculty of Medical Science

Department of Pharmacy

Program of B. Pharmacy

# Course Plan (Syllabus) of Dermatological & Cosmetic Preparations

**Course Code. PH1124277**

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

2024

## II. Course Identification and General Information:

1.	<b>Course Title:</b>	Dermatological & Cosmetic Preparations				
2.	<b>Course Code:</b>	PH1124277				
3.	<b>Course Type:</b>	Compulsory course				
4.	<b>Credit Hours:</b>	<b>Credit Hours</b>	<b>Theory Contact Hours</b>		<b>Practical Contact Hours</b>	
			<b>Lecture</b>	<b>Tutorial/ Seminar</b>	<b>Lab</b>	<b>Clinical</b>
		3	2		1	--
5.	<b>Level/ Semester at which this Course is offered:</b>	4th Level / 2nd Semester				
6.	<b>Pre –Requisite (if any):</b>	Pharmaceutics II				
7.	<b>Co –Requisite (if any):</b>	-----				
8.	<b>Program (s) in which the Course is Offered:</b>	Bachelor of pharmacy				
9.	<b>Language of Teaching the Course:</b>	English				
10.	<b>Location of Teaching the Course:</b>	Faculty of Medical Sciences, Thamar University				
11.	<b>Prepared by:</b>	Dr. Abdulkarim K. Alzomor				
12.	<b>Reviewed By:</b>					
13.	<b>Date and Number of Approval by Council:</b>					

### Course Specification of: Dermatological & Cosmetic Preparations Code. (PH1124277)

Prepared by:

Reviewed by:

Head of the Department:

Dean of Faculty:

Dean of Center of Development  
and Quality assurance:

### III. Course Description:

This course has been designed to provide students with a detailed knowledge and understanding of formulation, preparation and packaging of a different cosmetics preparation. Students will be given thorough knowledge on cosmetics preparation like skin, hair care products, dentifrices, deodorants and makeup preparations.

### IV. Course Intended Learning Outcomes (CILOs) :

Upon successful completion of the Course, student will be able to:

#### A. Knowledge and Understanding:

- |    |                                                                           |
|----|---------------------------------------------------------------------------|
| a1 | Explain the formulation and packaging of different cosmetics preparation. |
| a2 | Identify the role of different excipients used in cosmetics preparation   |

#### B. Intellectual Skills:

- |    |                                                                                       |
|----|---------------------------------------------------------------------------------------|
| b1 | Determine the suitable components for different formulation of cosmetics preparation. |
|----|---------------------------------------------------------------------------------------|

#### C. Professional and Practical Skills:

- |    |                                                      |
|----|------------------------------------------------------|
| c1 | Formulate suitable and stable cosmetics preparation. |
| c2 | Evaluate pharmaceutical cosmetics preparation        |

#### D. Transferable Skills:

- |    |                                                                                                          |
|----|----------------------------------------------------------------------------------------------------------|
| d1 | Perform tasks and costs of the course independently and be able to work as an effective member in a team |
| d2 | Employ the technologies services to solve problems of pharmaceutical calculation and develop skills.     |

### V. Course Contents:

#### A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1	<b>Introduction</b>	<ul style="list-style-type: none"> <li>Fundamentals of cosmetic science</li> </ul>	1	2
2	<b>Cosmetics for skin</b>	Structures and functions of skin <ul style="list-style-type: none"> <li>Formulation, Preparation and Packaging of               <ul style="list-style-type: none"> <li>Antiwrinkle preparations and vanishing and emollient creams</li> </ul> </li> </ul>	5	10

#### Course Specification of: Dermatological & Cosmetic Preparations Code. (PH1124277)

Prepared by:

Reviewed by:

Head of the Department:

Dean of Faculty:

Dean of Center of Development and Quality assurance:

		<ul style="list-style-type: none"> <li>○ Shaving preparations</li> <li>○ Anti-acne products</li> <li>○ Sunscreen preparations and skin bleaches</li> <li>○ Skin cleansing preparations</li> <li>○ Anti-aging preparation</li> <li>○ Depilatory preparations</li> <li>○ Depigmentation products</li> </ul>		
3	Midterm exam		1	2
4	Cosmetics for hair.	Structures and functions of hair . <ul style="list-style-type: none"> <li>● Formulation, Preparation and Packaging of               <ul style="list-style-type: none"> <li>○ Hair shampoo</li> <li>○ Hair styling/colorant products</li> </ul> </li> </ul>	1	2
5	Dentifrices	Formulation, Preparation and Packaging of <ul style="list-style-type: none"> <li>○ Toothpaste</li> <li>○ Gel</li> <li>○ Powders</li> </ul>	2	4
6	Deodorants and antiperspirants	Formulation, Preparation and Packaging of deodorants and antiperspirants	2	4
7	Makeup preparations	<ul style="list-style-type: none"> <li>● <b>Formulation</b>, Preparation and Packaging of               <ul style="list-style-type: none"> <li>○ Nail polish</li> <li>○ Lipsticks</li> </ul> </li> <li>● Eye lashes</li> </ul>	3	6
8	Final exam		1	2
Number of Weeks /and Units Per Semester			16	32

**Course Specification of: Dermatological & Cosmetic Preparations Code. (PH1124277)**

Prepared by:

Reviewed by:

Head of the Department:

Dean of Faculty:

Dean of Center of Development and Quality assurance:

B – Practical Aspect:			
Order	Practical Experiment	Number of weeks	Contact hours
1	Preparation of Cold cream	1	2
2	Preparation of vanishing cream	1	2
3	Preparation of transparent shampoo	1	2
4	Preparation of egg shampoo	1	2
5	Preparation of hand and body lotion,	1	2
6	Preparation of Shaving cream	1	2
7	Preparation of toothpaste and powder	1	2
8	Preparation of After-shave lotion etc.	1	2
9	Preparation of lipsticks	1	2
10	Quality control of cosmetics products Determination of pH, rinse-ability and sensitivity	1	2
11	Quality control of cosmetics products checking the viscosity and related rheological properties	2	4
12	Quality control of cosmetics products Stability and microbiological aspect	1	2
13	Final exam	1	2
Number of Weeks/and Units Per First semester4			28

**Course Specification of: Dermatological & Cosmetic Preparations Code. (PH1124277)**

Prepared by:

Reviewed by:

Head of the Department:

Dean of Faculty:

Dean of Center of Development  
and Quality assurance:



## VI. : Teaching Strategies of the Course:

### (A) (Knowledge and Understanding)

- Lectures and Groups discussion.
- Self – learning

### (B) (Intellectual Skills)

- Dialogue and discussion
- solving Problem

### (C) (Professional and Practical Skills)

- Lectures
- Simulation & presentations

### (D) (Transferable Skills)

- Self – learning
- Cooperative learning

## VII. Assessment Methods of the Course:

### (A) (Knowledge and Understanding)

- Quizzes, Presentation and Written exam.

### (B) (Intellectual Skills)

- Quizzes, Homework

### (C) (Professional and Practical Skills)

- Performance, Report

### (D) (Transferable Skills)

- Homework's evaluation.
- Evaluation of Research reports

## VIII. Assignments:

No.	Assignments	Week Due	Mark
1	Assignment 1: Attendance	1-14	10
2	Assignment 2: Homework, Research & Quizzes.	6&12	5

### Course Specification of: Dermatological & Cosmetic Preparations Code. (PH1124277)

<b>Total</b>	<b>15</b>
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### IX. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments	1-14	15	15%
2	Mid-Term Theoretical Exam	8	15	15%
3	Mid-Term Practical Exam	7	10	10%
4	Final Practical Exam including Project Presentation & Evaluation	14	20	20%
5	Final Theoretical Exam	16	40	40%
<b>Total</b>			<b>100</b>	<b>100%</b>

### X. Learning Resources:

- Written in the following order: Author, Year of publication, Title, Edition, Place of publication, Publisher.

**1- Required Textbook(s) (maximum two ):**

Ralph Gordon Harry and Martin M. Rieger (2000). Harry's Cosmeticology. 8th Edition. England.

**2- Essential References:**

1- Balsam and Edward Sagarin(1992). Cosmetics: Science and Technology. Wiley-Interscience, London.

**Websites:**

### XI. Course Policies: (Based on the Uniform Students' Bylaw (2007))

<b>1</b>	<p><b>Class Attendance:</b></p> <p>Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.</p>
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2	<b>Tardiness:</b> A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	<b>Exam Attendance/Punctuality:</b> No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	<b>Assignments &amp; Projects:</b> Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	<b>Cheating:</b> Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	<b>Forgery and Impersonation:</b> Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	<b>Other policies:</b> The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.

Faculty: Faculty of Medical Sciences  
Program: Bachelor of Pharmacy  
Course: Biostatistics

I. Course Identification and General Information:					
1	Course Title:	Biostatistics			
2	Course Code & Number:	PH1124283			
3	Credit hours:	C.H			TOTAL
		Th.	Seminar	Pr	
		2			
4	Study level/ semester at which this course is offered:	4 <sup>th</sup> Level/ 2 <sup>nd</sup> 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 Main.			
10	Prepared By:	Assoc. Prof. Dr. Abdulelah H. Al-Adhroey Dr. Mohammed A. Al-Kholani			
11	Date of Approval				

## II. Course Description:

Biostatistics course is intended to provide medical sciences students with fundamental concepts of the theoretical and applied skills of biostatistics making them able to calculate and interpret common statistical measures used in describing and analyzing health and clinical data. Topics include: Sources of health information; Organization, summarizing and displaying of data; Common statistic measurements to describe medical data , statistic tests for the confidence, differences, and compare risk; statistics formula to analyze the relationships, survival, and clinical investigations and screening.

## III. Course Objectives:

After completing this program, students would be able to

- Demonstrate theoretical knowledge for the purposes and methods of the steps of statistical data processing (organization, summarization and displaying) related to the medical and health fields.
- Classify the collected raw data according to the types of variables that are being studied.
- Choose appropriate statistical tables, graphs and charts to display data, and its analyze
- Calculate and interpret common statistical measures used in describing and analyzing medical and health data.
- Apply the SPSS program in data analysis.

#### IV. Course Intended Learning Outcomes (CILOs) :

##### Knowledge and Understanding:

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

Knowledge and Understanding PILOs	Knowledge and Understanding CILOs
After completing this program, students would be able to:	After completing this course, students would be able to:
A	a1- describe fundamental features of biostatistics, and their applications.
A	a2 explain the kind, uses and sources of health information-
A	a3 explain principles of random sampling, systematic sampling, stratified sampling, cluster Sampling..
A	A4 describe basic concepts and methods for interpreting and communicating data
A	A5 discuss the common statistics used for medical data description including percentage, mode, median, mean
A	A6 Explain Statistic tests of the confidence, differences, compare risk, and analyze relationships
A	A7 explain the major differences among linear regression, logistic regression and regression models for survival analyses
A	A8- describe the processes, uses, and evaluation of surveillance and screening of diseases

##### 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:
B	b1-solve problems in the fields of health by using suitable statistical measures and methods.
B	b2 differentiate among random sampling, systematic sampling, stratified sampling, cluster sampling
B	b3 classify the collected raw data according to the types of variables that are being studied
B	b4 choose appropriate statistical tables, graphs and charts to display data, and its analyze.
B	b5 select the appropriate display format according to the data type.
B	b6 distinguish, calculate, and interpret measures occurrence of diseases, and mortality measures

<b>Professional and Practical Skills</b>	
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:
<b>C</b>	c1- Use the elementary functions of Excel or SPSS program to conduct statistical analysis and draw graphs
<b>C</b>	c2- Prepare and apply graphical and tabular methods to display data, and its analyze

<b>Transferable (General) Skills :</b>	
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:
<b>D1</b>	d1 Adopt the principles of lifelong learning needed for continuous professional development.
	d2 Evaluate information including the use of information technology where applicable

## V. Alignment Course Intended Learning Outcomes

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a 1	Interactive lectures Discussion Brain Storm Seminars..	Written Exam Assignments Presentations Quizzes
a 2		
a 3		
a 4		
a 5		
a 6		
a 7		
a 8		

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

Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b 1	<ul style="list-style-type: none"> <li>- Interactive lectures</li> <li>- discussion and dialog</li> <li>- Brain Storm</li> <li>- Problem solving</li> <li>- Seminars.</li> <li>- Case study</li> </ul>	Exam Assignments Presentations.
b 2		
b 3		
b 4		
b 5		
b 6		

(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	Exercises in the class. Group (Small group) discussion Independent study	Exams Assignments Presentation/ observation Case Report
c2		

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1	<ul style="list-style-type: none"> <li>- Independent study</li> <li>- Group work activities</li> <li>- Written researches</li> </ul>	Exams Assignments / homework Presentation/ observation
d2		

V. Course Content:					
A – Theoretical Aspect:					
Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)



1	<b>INTRODUCTION TO BIOSTATISTICS</b>	<ul style="list-style-type: none"> <li>• Biostatistics: definition, importance in medical and health fields</li> <li>• What kind of health information do we need?</li> <li>• Uses of health information</li> <li>• Sources of health information</li> </ul>	1	2	a1, a2, a3, b1
2	<b>SAMPLING METHODS</b>	Random sampling, Systematic Sampling, Stratified Sampling, Cluster Sampling, Sample size	1	2	a1, a3; b1, b2
3	<b>SUMMARIZING DATA</b>	<ul style="list-style-type: none"> <li>• Organizing data</li> <li>• Types of variable: <i>measurement scale types</i></li> <li>• Frequency distributions</li> <li>• Methods for Summarizing Data</li> </ul>	1	2	a1, a4; b1, b3
4	<b>COMMON STATISTICS WHICH DESCRIBE MEDICAL DATA</b>	<ul style="list-style-type: none"> <li>• Percentages</li> <li>• Mean</li> <li>• Median</li> <li>• Mode</li> <li>• Standard deviation and variance</li> </ul>	1	2	a1, a5; b1
5	<b>STATISTICS WHICH TEST CONFIDENCE</b>	<ul style="list-style-type: none"> <li>• Confidence intervals</li> <li>• P values</li> </ul>	1	2	a1, a6; b1
6	<b>STATISTICS WHICH TEST DIFFERENCES</b>	<ul style="list-style-type: none"> <li>• t tests and other parametric tests</li> <li>• Mann-Whitney and other non-parametric tests</li> <li>• Chi-squared</li> </ul>	1	2	a1, a6; b1; d1
7	<b>STATISTICS WHICH COMPARE RISK</b>	<ul style="list-style-type: none"> <li>• Risk ratio</li> <li>• Odds ratio</li> <li>• Risk reduction and numbers needed to treat</li> <li>• Using Computer Technology</li> </ul>	1	2	a1, a6; b1; c1
8	Midterm Exam.		1	2	a1-a6; b1-b3
9	<b>STATISTICS WHICH ANALYZE RELATIONSHIPS</b>	<ul style="list-style-type: none"> <li>• Correlation</li> <li>• Regression</li> </ul>	1	2	a1, a6; b1
10	<b>STATISTICS WHICH ANALYZE SURVIVAL</b>	<ul style="list-style-type: none"> <li>• Survival analysis: life tables and Kaplan–Meier plots</li> <li>• The Cox regression model</li> </ul>	1	2	a1, a7; b1
11	<b>STATISTICS WHICH ANALYZE</b>	<ul style="list-style-type: none"> <li>• Sensitivity, specificity and predictive value</li> <li>• Level of agreement and</li> </ul>	1	2	a1, a8; b1

	CLINICAL INVESTIGATIONS AND SCREENING	Kappa			
12	DISPLAYING DATA	<ul style="list-style-type: none"> <li>• Introduction to tables and graphs</li> <li>• Tables <ul style="list-style-type: none"> <li>• One-variable tables</li> <li>• Two- and three-variable tables</li> <li>• Tables of statistical measures other than frequency</li> <li>• Composite tables</li> <li>• Table shell</li> <li>• Creating class intervals</li> </ul> </li> <li>Using Computer Technology</li> </ul>	1	2	a1,a4; b1, b4,b5 ; c1, c2; d1-d2
13	DISPLAYING DATA	<ul style="list-style-type: none"> <li>• Graphs <ul style="list-style-type: none"> <li>• Arithmetic-scale line graphs</li> <li>• Semilogarithmic-scale line graphs</li> <li>• Histograms</li> <li>• Population pyramid, frequency polygons and cumulative frequency and survival curves, and scatter diagrams</li> <li>• Bar charts, grouped, stacked 100% component, deviation bar charts and pie charts</li> <li>• Dot plots and box plots and forest plots, phylogenetic and decision trees</li> <li>• Maps</li> </ul> </li> <li>• Using Computer Technology</li> </ul>	1	2	a1,a4; b1,b4,b5; c1, c2; d1-d2
14	OTHER CONCEPTS	<ul style="list-style-type: none"> <li>• Multiple testing adjustment</li> <li>• 1-and 2-tailed tests</li> <li>• Incidence</li> <li>• Prevalence (= Point Prevalence Rate)</li> <li>• The power of a study: probability to detect a statistically significant difference.</li> <li>• Bayesian statistics</li> </ul>	1	2	a1; b1,b6; d1-d2

		<ul style="list-style-type: none"> <li>Mortality measures rates</li> </ul>			
15	<b>STATISTICS AT WORK</b>	Real-life examples of how researchers use statistical techniques to describe and analyze their work addresses.	1	2	a1-a7; b1-b6
16	Final Exam.		1	2	a1-a8; b1-b6; c2
	Total		16	32	

## VI. Teaching strategies of the course:

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

## VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Quiz	a1,a2,a6; b1	3,10	7
2	Homework /Research reports/ Tasks	a1,a6 ; b1,b6; d1	6,14	5
4	Research and seminar	a1,a4; b1, b4,b5; d1-d2	12,13	8

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Quizzes; Homework/ Research reports; Research and seminar	3, 6 ,10, 12,13, 14	20	20%	a1,a2, a4,a6; b4,b5, b6; d1,d2
2	Midterm exam( MCQ& Written)	8	20	20%	a1-a6; b1-b3,c1
3	Final exam ( MCQ& Written)	16	60	60%	a1-a8; b1-b6; c2
<b>Total</b>			<b>100</b>	<b>100%</b>	

## VIII. Learning Resources:

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

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

- 1- Harris M, Taylor Gordon. (2004). MEDICAL STATISTICS MADE EASY. London And New York ,Martin Dunitz, an imprint of the Taylor & Francis Group
- Sanyal, P. (2015). Community Medicine: A Students Manual, 1st edition. New Delhi, London, Philadelphia, Panama: Jaypee Brothers Medical Publishers (P) Ltd.
- 2- U.S. Department of Health and Human Services: Centers for Disease Control and Prevention (CDC). (2012). Principles of Epidemiology in Public Health Practice: An Introduction to Applied Epidemiology and Biostatistics, 3rd Edition. Atlanta, USA: CDC.

### 2- Essential References.

1. Sanyal, P. (2015). Community Medicine: A Students Manual, 1st edition. New Delhi, London, Philadelphia, Panama: Jaypee Brothers Medical Publishers (P) Ltd.
2. منظمة الصحة العالمية. (٢٠١١). طب المجتمع: الكتاب الطبي الجامعي. بيروت، لبنان: اكاديميا انترناشيونال.
3. U.S. Department of Health and Human Services: Centers for Disease Control and Prevention (CDC). (2012). Principles of Epidemiology in Public Health Practice: An Introduction to Applied Epidemiology and Biostatistics, 3rd Edition. Atlanta, USA: CDC.
4. Agrawal, S., et al. (2009). Textbook of Public Health and Community Medicine, 1st edition. New Delhi, India: Department of Community Medicine, AFMC, WHO, India Off
5. Park, K. (2015) Park's Textbook of Preventive and Social Medicine, 23th edition, Jabal India: Bhanot.

### 3- Electronic Materials and Web Sites etc.

1. World Health Organization: [www.who.int](http://www.who.int)
2. Centers for Disease Control and Prevention: [www.cdc.gov](http://www.cdc.gov)

**Course Specification of  
Pharmacoeconomics & pharmacovigilance**

I. Course Identification and General Information:						
1	Course Title:	Pharmacoeconomics & pharmacovigilance				
3	Course Code & Number:	PH1124265				
3	Credit hours:	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2				
4	Study level/ semester at which this course is offered:	Level 4/ semester 2				
5	Pre –requisite (if any):					
6	Co –requisite (if any):					
7	Program (s) in which the course is offered:	Bachelor of Pharmacy and Pharm. D.				
8	Language of teaching the course:	English				
9	Location of teaching the course:	Thamar University - Faculty of Medical Sciences				
10	Prepared By:	Dr. Ahmed G. Al- Akydy – Dr. Ahmed Al-Washli				
11	Date of Approval	2021				

### II. Course Description:

This course is to introduce students to the fundamental methods of pharmacoeconomic analysis. Topics include the terminology used in pharmacoeconomics, research methods frequently used in pharmacoeconomics, the role of pharmacoeconomics in the drug development process and health care decision making relevant to the practice of pharmacy, cost/benefit assessment, public health systems. The second part of this course provides **the student** with the basic terminologies used in pharmacovigilance, and trains student of various methods that can be used to generate safety data and signal detection, and develops the skills of classifying drugs, diseases and adverse drug reactions.

### III. Course Objectives:

1. To introduce student to the basic principles and concepts of pharmacoeconomics.
2. To familiarize student with the different types of cost analysis that used in pharmacoeconomics
3. To enable the student to deal with adverse drug reaction reporting systems and communication in pharmacovigilance

### I. Course Intended Learning Outcomes (CILOs) :

#### Knowledge and Understanding:

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

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

- a1. Understand the fundamental aspects of pharmacoeconomics in therapeutic plan.
- a2. Define cost-minimisation, cost-effectiveness, cost-utility and cost-benefit.
- a3. Know the different methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle and drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation

Knowledge and Understanding PILOs		Knowledge and Understanding CILOs	
After completing this program, students would be able to:		After completing this course, students would be able to:	
A1	Explain the fundamentals of general sciences and the basic and biomedical sciences and their relations to pharmacy profession.		
A2	Illustrate the fundamentals of social and behavioral sciences relevant to pharmacy, ethics of health care and its impact on their relationship with patients and other healthcare professionals.	a1	<b>Understand</b> the fundamental aspects of pharmacoeconomics in therapeutic plan.
		a2	<b>Define</b> cost-minimisation, cost-effectiveness, cost-utility and cost-benefit.
A3	Describe relationships between chemical structure of compounds of pharmaceutical and medicinal interest and biological activities		
A4	Define basic principles of drug: target identification, design, informatics, and mechanisms of action		
A5	Outline principles of clinical pharmacology, therapeutics and Pharmacovigilance.	a3	<b>Know</b> the different methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle and drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation

### Intellectual Skills :

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

- b1. Select the proper drugs for various disease conditions using pharmacoeconomics principles.  
b2. Differentiate between the different methods of cost analysis (cost-minimisation, cost-effectiveness, cost-utility and cost-benefit).  
b3. Detection of new adverse drug reactions and their assessment based on the principle information of pharmacovigilance

Intellectual Skills PILOs		Intellectual Skills CILOs	
After completing this program, students would be able to:		After completing this course, students would be able to:	
B1	Classify the synthetic and natural drugs according to their mechanism of action, systemic effect, therapeutic uses, contraindication and toxicity		
B2	Design risk reduction strategies to ensure patient safety and prevent medication errors, drug interaction, and adverse drug effects	b3	<b>Detection</b> of new adverse drug reactions and their assessment based on the principle information of pharmacovigilance
B3	Solve problems to reduce drug therapy problems		
B4	Select drug therapy regimen using	b1	<b>Select</b> the proper drugs for various disease

	mathematical, genomic, clinical pharmacokinetic and pharmacodynamics principles for optimizing the patient therapy and medication safety		conditions using pharmacoeconomics principles.
		b2	<b>Differentiate</b> between the different methods of cost analysis (cost-minimisation, cost-effectiveness, cost-utility and cost-benefit.

### Professional and Practical Skills

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

- c1. Utilize the economic principles, and estimate cost profits in a given processes for optimizing therapeutic care  
c2. Apply the principles of pharmacoeconomics for calculation of cost-minimisation, cost-effectiveness, cost-utility and cost-benefit in pharmacotherapy.  
c3. Apply the appropriate methods in pharmacovigilance to evaluate the drug safety in patients particularly in paediatrics, geriatrics, pregnancy and lactation

Professional and Practical Skills PILOs		Professional and Practical Skills CILOs	
After completing this program, students would be able to:		After completing this course, students would be able to:	
C1	Handle the chemical, biological, and pharmaceutical materials safely		
C2	Operate different pharmaceutical equipment and instruments		
C3	Extract active substances from different sources.		
C4	Carry outpatient physical assessment.		
C5	Advise the patients and health care professionals for optimizing medicines use.	c2	<b>Apply</b> the principles of pharmacoeconomics for calculation of cost-minimisation, cost-effectiveness, cost-utility and cost-benefit in pharmacotherapy.
		c1	<b>Utilize</b> the economic principles, and estimate cost profits in a given processes for optimizing therapeutic care
		c3	<b>Apply</b> the appropriate methods in pharmacovigilance to evaluate the drug safety in patients particularly in paediatrics, geriatrics, pregnancy and lactation

### Transferable (General) Skills :

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

- d1. Use information systems and computer softwares in order to enhance the delivery of pharmacoeconomic in therapeutic care.  
D2. Work effectively as a part of a team to perform the required tasks related to pharmacovigilance.

Transferable (General) Skills PILOs	Transferable (General) Skills CILOs
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After completing this program, students would be able to:		After completing this course, students would be able to:	
<b>D1</b>	Communicate effectively and ethically with patients, public, and health care professionals.	d1	
<b>D2</b>	Use information systems and computer softwares in order to enhance the delivery of pharmaceutical care,	<b>d1</b>	<b>Use</b> information systems and computer softwares in order to enhance the delivery of pharmaco-economic in therapeutic care.
<b>D3</b>	Work effectively individually and in a team	<b>d2</b>	<b>Work</b> effectively as a part of a team to perform the required tasks related to pharmacovigilance.
<b>D4</b>	Have the skills of decision-making and time management and lifelong learning		

## II. 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
<b>a1</b> <b>Understand</b> the fundamental aspects of pharmaco-economics in therapeutic plan.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Discussion Sessions</li> <li>Assignments</li> </ul>	<ul style="list-style-type: none"> <li>Periodic exam (Quizzes)</li> <li>Evaluate assignments</li> <li>Mid &amp; final exam</li> </ul>
<b>a2</b> <b>Define</b> cost-minimisation, cost-effectiveness, cost-utility and cost-benefit		
<b>a3</b> <b>Know</b> the different methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle and drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation		

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
<b>b1</b> <b>Select</b> the proper drugs for various disease conditions using pharmaco-economics principles.	<ul style="list-style-type: none"> <li>Discussion Sessions</li> <li>Problem solving</li> <li>Group discussion</li> <li>Assignments</li> </ul>	<ul style="list-style-type: none"> <li>Oral presentations</li> <li>Evaluate assignments</li> <li>Mid &amp; final exam</li> </ul>
<b>b2</b> <b>Differentiate</b> between the different methods of cost analysis (cost-minimisation, cost-effectiveness, cost-utility and cost-benefit.		
<b>b3</b> <b>Detection</b> of new adverse drug reactions and their assessment based on the principle		



information of pharmacovigilance		
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**(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	<b>Utilize</b> the economic principles, and estimate cost profits in a given processes for optimizing therapeutic care	<ul style="list-style-type: none"> <li>• Discussion sessions</li> <li>• Assignments</li> </ul>	<ul style="list-style-type: none"> <li>• Oral presentations</li> <li>• Theory &amp; Practical exams</li> <li>• LAB report</li> <li>• Evaluate assignments</li> </ul>
c2	<b>Apply</b> the principles of pharmacoeconomics for calculation of cost-minimisation, cost-effectiveness, cost-utility and cost-benefit in pharmacotherapy.		
c3	<b>Apply</b> the appropriate methods in pharmacovigilance to evaluate the drug safety in patients particularly in paediatrics, geriatrics, pregnancy and lactation		

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

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1	<b>Use</b> information systems and computer softwares in order to enhance the delivery of pharmacoeconomic in therapeutic care.	<ul style="list-style-type: none"> <li>• Discussion Sessions</li> <li>• Assignments that require collecting information from the internet.</li> </ul>	<ul style="list-style-type: none"> <li>• Oral presentations</li> <li>• Writing</li> </ul>
d2	<b>Work</b> effectively as a part of a team to perform the required tasks related to pharmacovigilance.		

**V. Course Content:**

**A – Theoretical Aspect:**

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Principles of Pharmacoeconomic	<ul style="list-style-type: none"> <li>- Definitions</li> <li>- Principles for evaluating and conducting pharmacoeconomics studies</li> </ul>	1W	2	a1; b1; c1;
2	Types and methods of Pharmacoeconomic analyses		1W	2	a1; b1;
3	Applications of Pharmacoeconomics	<ul style="list-style-type: none"> <li>- Strategies for integrating pharmacoeconomics measurements and drug therapy</li> </ul>	1W	2	a1; b1;c1; d1
		<ul style="list-style-type: none"> <li>- In strategic management of hospitals</li> </ul>	1W	2	a1;
4	Cost	<ul style="list-style-type: none"> <li>- Cost description, types and methods</li> <li>- Measuring and estimating costs</li> </ul>	1W	2	a1; b2; c2;

		- Cost-effectiveness and incremental analysis - Cost-minimization analysis	1W		a2; b2; c2;
		- Cost-utility analysis - Cost-benefit analysis	1W		a2; b2; c2;
		- Describe the steps involved in determining the cost of therapy or services	1W	2	a2; b2; c2;
7	Introduction to Pharmacovigilance •	- History and development of Pharmacovigilance Importance of safety monitoring of Medicine	1W	2	a3; d2
8	Introduction to adverse drug reactions •	- Definitions and classification of ADRs • - Detection and reporting • Methods in causality assessment - Management of adverse drug reactions	1W	2	a3; b3; c3; d2
9	Information resources in pharmacovigilance	- Basic drug information resources - Specialized resources for ADRs	1W	2	a3; b3;
10	Vaccine safety surveillance	- Vaccine Pharmacovigilance - Vaccination failure - Adverse events following immunization	1W	2	a3; b3; c3;
11	Pharmacovigilance methods	- Passive surveillance – - Spontaneous reports and case series - Active surveillance – - Comparative observational studies – Cross sectional study, case control study and cohort study •	1W	2	a3; b3; c3; d2
12	Drug safety evaluation in special population	- Geriatrics - Paediatrics - Pregnancy - Lactation	1W	2	a3; b3; c3;
Number of Weeks /and Units Per Semester					

#### VI. Teaching strategies of the course:

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

V. Assignments:				
No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Participation	5	Weekly	a1; a2; a3; b1; c1
2	Quizzes	5	Weekly	a1; a2; a3; b1
3	Research	5	6 <sup>th</sup> W	a2; a3; b2; b3; c2; c3; d1; d2
4	Assignments	5	6 <sup>th</sup> W	a1; a2; a3; b2; b3; c2; c3; d1
	Mid – Exam (theoretical)	20	7 <sup>th</sup> W	a1; a2; a3; b1
	<b>Total score</b>	<b>40%</b>		

V. Schedule of Assessment Tasks for Students During the Semester:					
No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments & Homework, Tasks & Presentation	Fortnightly	10	10%	a1; a2; a3; b2; b3; c2; c3; d1
2	Quizzes	W6	5	5%	a1; a2; a3; b1
3	Mid-Term exam	W8	20	20%	a1; a2; a3; b1
4	Practical reports	W12	5	5%	a1; a2; a3; b1; c2; c3
6	Final Exam theory	W16	60	60%	a1; a2; a3; b1
	<b>Total</b>		<b>100</b>	<b>100%</b>	

VII. Learning Resources:	
<b>1- Required Textbook(s) ( maximum two ).</b>	
	1. Pharmacoeconomics: From Theory to Practice (Drug Discovery) Renee J. G. Arnold 2009 2. Textbook of Pharmacovigilance: S K Gupta, Jaypee Brothers, Medical Publishers.
<b>2- Essential References.</b>	
	1. Pharmacoeconomics. Tom Walley, Alan Haycox, Angela Bolandb Churchill Livingstone, 2004 2. Principles of Pharmacoeconomics. J Lyle Bootman, Raymond J Townsend, and William F McGha 3rd Ed. 08/28/2004. 3. Stephens' Detection of New Adverse Drug Reactions: John Talbot, Patrick Walle, WileyPublishe
<b>3- Electronic Materials and Web Sites etc.</b>	



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



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

## Faculty of Medical sciences

Department of Pharmacy

Program of B. Pharmacy

# Course Specification of Biopharmaceutics & Pharmacokinetics 2 Course Code. (PH1124275)

2024



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

## I. General Information:

1.	Course Title:	Biopharmaceutics & Pharmacokinetics 2				
2.	Course Code:	PH1124275				
3.	Course Type:	Compulsory course				
4.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours	
			Lecture	Tutorial/ Seminar	Lab	Clinical
		3	2	1		--
5.	Level/ Semester at which this Course is offered:	Fourth Level / Second Semester				
6.	Pre –Requisite (if any):	Biopharmaceutics				
7.	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. Abdulkarim K. Alzomor				
12.	Reviewed By:					
13.	Date and Number of Approval by Council:					

### Course Specification of: Pharmacokinetics Code. (PH1124175)

## II. Course Description:

In this course the students study the types of models, order of kinetics and methods of calculation the rate and extent of drugs absorption, distribution and elimination with time following one and two compartment I.V bolus, oral and I.V infusion. Also, the students will study the principles of the linear and non-linear pharmacokinetic models and their application.

## III. Course Intended Learning Outcomes (CILOs) :

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

Referenced PILOs

A. Knowledge and Understanding:		I, P or M/A		
a1	Identify the basic of pharmacokinetics: orders, models. and parameters. for drug absorption, distribution and elimination.	A	A2	Sufficiently knows of the analytical & biotechnical techniques, necessary for isolation, refinement, analysis & titration & manufacturing of pharmaceutical substances & preparations.
a2	Explain the differentiate between linear and non-linear pharmacokinetic parameters for drugs.	A	A5	Enumerate correctly the principles of pharmacokinetics & biopharmaceutics & and their applications in pharmacological therapy.
B. Intellectual Skills:				
b1	Predicts the pharmacokinetics parameters need for adjustment the dose of new drug development.	A	B5	Carefully analyzes, the doses & pharmacokinetics by using calculations & statistical methods & information techniques.
C. Professional and Practical Skills:				
c1	Calculate the in vivo and in vitro pharmacokinetic parameters relate to bioequivalence drugs evaluation.	A	C1	Correctly use, the terminologies & abbreviations and the proper pharmaceutical symbols in pharmaceutical practices.

### Course Specification of: Biopharmaceutics & Pharmacokinetics 2 Code. (PH1124275)

c2	Utilize pharmacokinetic models to calculate the quantity for drug absorption, distribution, elimination and other parameters.	A	C4	Efficiently operates, the different technologies and equipment in the area of pharmacy.
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#### D. Transferable Skills:

d1	Perform tasks and costs of the course independently and be able to work as an effective member in a team	A	D1	Works effectively in a unique team.
d2	Employ the technologies services to solve problems of pharmaceutical calculation and develop skills.	A	D2	Correctly uses, the means of the technology, information, programs of computer and the statistical programs, which contribute in raising the health level.

I= Introduced, P=Practiced or M/A= Mastered/Advanced

IV. Alignment of Course Intended Learning Outcomes			
(A) Alignment of Course Intended Learning Outcomes (Knowledge and Understanding) to Teaching Strategies and Assessment Methods:			
Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies	
a1	Identify the basic of pharmacokinetics: orders, models. and parameters. for drug absorption, distribution and elimination.	<ul style="list-style-type: none"> <li>- Lectures and Groups discussion.</li> <li>- Self – learning</li> </ul>	<ul style="list-style-type: none"> <li>▪ Quizzes, Presentation and Written exam.</li> </ul>
a2	Explain the differentiate between linear and non-linear pharmacokinetic parameters for drugs.		
(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching Strategies and Assessment Methods:			
Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies	

#### Course Specification of: Biopharmaceutics & Pharmacokinetics 2 Code. (PH1124275)

b1	Predicts the pharmacokinetics parameters need for adjustment the dose of new drug development.	- Dialogue and discussion - solving Problem	- Quizzes, Homework
<b>(C) Alignment of Course Intended Learning Outcomes (Professional and Practical Skills) to Teaching Strategies and Assessment Methods:</b>			
<b>Course Intended Learning Outcomes</b>		<b>Teaching Strategies</b>	<b>Assessment Strategies</b>
c1	Calculate the in vivo and in vitro pharmacokinetic parameters relate to bioequivalence drugs evaluation.	- Lectures - Simulation & presentations	▪ Performance, Report
c2	Utilize pharmacokinetic models to calculate the quantity for drug absorption, distribution, elimination and other parameters.		
<b>(D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods:</b>			
<b>Course Intended Learning Outcomes</b>		<b>Teaching Strategies</b>	<b>Assessment Strategies</b>
d1	Perform tasks and costs of the course independently and be able to work as an effective member in a team	- Self – learning - Cooperative learning	- Homework's evaluation. ▪ Evaluation of Research reports
d2	Employ the technologies services to solve problems of pharmaceutical calculation and develop skills.		



## V. Course Contents:

### A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	<b>Introduction to pharmacokinetics</b>	<ul style="list-style-type: none"> <li>• Terminology and definitions</li> <li>• Rates and orders</li> <li>• Kinetic of drug absorption</li> <li>• Compartment models                             <ul style="list-style-type: none"> <li>○ Definition</li> <li>○ Basis of Classification</li> </ul> </li> <li>• Model selection criteria</li> </ul>	2	4	a1, c1, c2, d2
2	One compartment open model	<ul style="list-style-type: none"> <li>• Calculation of the following parameters ( for each model)                             <ul style="list-style-type: none"> <li>○ Volume of Distribution</li> <li>○ Elimination Rate Constant</li> <li>○ Clearance</li> <li>○ Elimination half life</li> <li>○ AUC</li> <li>○ Concentration at zero time.</li> </ul> </li> <li>• One Compartment I.V Bolus                             <ul style="list-style-type: none"> <li>○ Assumptions</li> <li>○ First-order kinetics</li> <li>○ Plasma data</li> <li>○ Area under the Curve</li> <li>○ Half-life</li> </ul> </li> <li>• Pharmacokinetics of Oral Administration                             <ul style="list-style-type: none"> <li>○ Differential Equation</li> <li>○ Integrated Equation</li> <li>○ Absorption Rate Constant (K)                                     <ul style="list-style-type: none"> <li>▪ Wagner nelson</li> <li>▪ Method of residual</li> </ul> </li> <li>○ Extent of Absorption</li> </ul> </li> <li>• Calculation of Bioavailability Parameters:                             <ul style="list-style-type: none"> <li>○ Calculation of Ka</li> </ul> </li> </ul>	4	8	a1, b1, c1, c2, d2

### Course Specification of: Biopharmaceutics & Pharmacokinetics 2 Code. (PH1124275)

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
		<ul style="list-style-type: none"> <li>○ Calculation of F</li> <li>● Intravenous Infusion: <ul style="list-style-type: none"> <li>○ Continuous infusion – steady state</li> <li>○ Combined infusion and bolus administration</li> <li>○ Combined slow and fast infusion</li> </ul> </li> </ul> <p>Post infusion</p>			
3		<ul style="list-style-type: none"> <li>● Midterm exam</li> </ul>	1	2	a1, b1, c1, d1
4	Two compartment open model with first order elimination kinetics	<ul style="list-style-type: none"> <li>● Pharmacokinetics of single dose as oral and intravenous (rapid/bolus.)</li> <li>● Intravenous infusion</li> <li>● Multiple oral and intravenous administrations.</li> </ul> <p>Pharmacokinetic of sustained releases formulation</p>	2	4	a1, b1, c1, d2
5	Non-linear pharmacokinetics (dose dependent kinetics)	<ul style="list-style-type: none"> <li>● Michaels- Menten's kinetics</li> <li>● Pharmacokinetic characteristics.</li> </ul> <p>In-vivo estimation of Km and Vm</p>	2	4	a2, b1, c1, d2
6	Multiple Administration:	<ul style="list-style-type: none"> <li>● Multiple I.V Bolus Dose <ul style="list-style-type: none"> <li>○ Independent doses</li> <li>○ Accumulating doses</li> <li>○ Development of general equation</li> <li>○ C<sub>pmax</sub> and C<sub>pmin</sub> equations</li> </ul> </li> <li>● Multiple Oral Dose Administration: <ul style="list-style-type: none"> <li>○ C<sub>pmin</sub> equation</li> </ul> </li> </ul> <p>Average C<sub>p</sub> equation</p>	2	4	a1, b1, c1, d2
7	Dosage regimen design	<ul style="list-style-type: none"> <li>● Calculation the dose</li> <li>● Calculation dosing interval</li> <li>● Average concentration</li> </ul>	2	4	a1, b1, c1, d1, d2
10	<b>Final exam</b>		1	2	a1, a2, b1, c1,

**Course Specification of: Biopharmaceutics & Pharmacokinetics 2 Code. (PH1124275)**

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
					c2, d1, d2
Number of Weeks /and Units Per Semester			16	32	

B – Tutorial:				
Order	Practical Experiment	Number of weeks	Contact hours	C-ILOs
1	Problems solving for Determination the kinetics order	1	2	a1, b1, c1, , d1, d2
2	Problems solving to calculate kinetic parameters ( $t_{1/2}$ , $vd$ , $cp^0$ , $cl$ , AUC, $ke$ , $T_{max}$ , $C_{max}$ )	1	2	a1, a2, b1, c1, c2, d1, d2
3	Problem solving for I.V. bolus dosing one compartment	1	2	a1, b1, c1, d1, d2
4	Problem solving for I.V. infusion one compartment	1	2	a1, b1, c1, d1, d2
5	Problem solving for oral dosing one compartment	1	2	a1, a2, b1, c1, c2, d1, d2
6	Calculation of AUC by trapezoidal method	1	2	a1, a2, b1, c1, c2, d1, d2
7	Calculation of $k_a$ by Wagner method	1	2	a1, b1, c1, d1, d2
8	Calculation of $k_a$ by method of residual	1	2	a1, b1, c1, d1, d2

**Course Specification of: Biopharmaceutics & Pharmacokinetics 2 Code. (PH1124275)**

9	Problem solving for I.V. bolus dosing two compartment	1	2	a1, b1, c1, d1, d2
10	Calculation of $k_{12}/k_{21}$ (distribution constant)	1	2	a1, b1, c1, d1, d2
11	Problem solving on dosage regimen kinetics	2	4	a1, b1, c1, d1, d2
12	Final exam	1	2	a1, a2, b1, c1, c2, d1, d2
Number of Weeks/and Units Per First semester <sup>3</sup>			26	

## VI. Assignments:

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	Assignment 1: Attendance	1-14	10	a1, a2, b1, c1, c2, d1, d2
2	Assignment 2: Homework, Problems & Quizzes.	6&12	10	a1, a2, b1, c1, c2, d1, d2
Total			20	

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments	1-14	20	20%	a1, a2, b1, c1, c2 d1, d2
2	Mid-Term Theoretical Exam	8	20	20%	a1, a2, b1, c1, c2 d1, d2.
3	Mid-term exam practice	7	10	10%	a1, a2, b1, c1, c2

### Course Specification of: Biopharmaceutics & Pharmacokinetics 2 Code. (PH1124275)

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
					d1, d2
	Final practice exam	13	10	10%	a1, a2, b1, c1, c2 d1, d2
5	Final Theoretical Exam	16	40	40%	a1, a2, b1, c1, c2 d1, d2
<b>Total</b>			<b>100</b>	<b>100%</b>	

VIII. Learning Resources:	
<ul style="list-style-type: none"> <li>Written in the following order: Author, Year of publication, Title, Edition, Place of publication, Publisher.</li> </ul>	
1- Required Textbook(s) (maximum two ):	
1- Leon Shargel Andrew (2012). Applied Biopharmaceutics and Pharmacokinetics, Sixth edition, Lippincott's and William, Philadelphia	
2- Essential References:	
1. Michel E. Winter (2011). Basic clinical pharmacokinetics, Fifth edition, Lippincott's and William, San Fransisco.	
Websites:	
1. <a href="http://www.boomer.org">www.boomer.org</a>	

IX. Course Policies: (Based on the Uniform Students' By law (2007)	
1	<p><b>Class Attendance:</b></p> <p>Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.</p>
2	<p><b>Tardiness:</b></p> <p>A student will be considered late if he/she is not in class after 10 minutes of the start time of class.</p>
3	<p><b>Exam Attendance/Punctuality:</b></p> <p>No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.</p>

**Course Specification of: Biopharmaceutics & Pharmacokinetics 2 Code. (PH1124275)**

4	<b>Assignments &amp; Projects:</b> Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	<b>Cheating:</b> Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	<b>Forgery and Impersonation:</b> Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	<b>Other policies:</b> The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.

## Faculty of Medical Science

Department of Pharmacy

Program of B. Pharmacy

# Course Plan (Syllabus) of Biopharmaceutics & Pharmacokinetics 2

**Course Code. PH1124275**

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

2024

### Course Specification of: Biopharmaceutics & Pharmacokinetics 2 Code. (PH1124275)

## II. Course Identification and General Information:

1.	Course Title:	Biopharmaceutics & Pharmacokinetics 2				
2.	Course Code:	PH1124275				
3.	Course Type:	Compulsory course				
4.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours	
			Lecture	Tutorial/ Seminar	Lab	Clinical
		3	2	1		--
5.	Level/ Semester at which this Course is offered:	Fourth Level / Second Semester				
6.	Pre –Requisite (if any):	Biopharmaceutics				
7.	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. Abdulkarim K. Alzomor				
12.	Reviewed By:					
13.	Date and Number of Approval by Council:					

### Course Specification of: Biopharmaceutics & Pharmacokinetics 2 Code. (PH1124275)



### III. Course Description:

In this course the students study the types of models, order of kinetics and methods of calculation the rate and extent of drugs absorption, distribution and elimination with time following one and two compartment I.V bolus, oral and I.V infusion. Also, the students will study the principles of the linear and non-linear pharmacokinetic models and their application.

### IV. Course Intended Learning Outcomes (CILOs) :

Upon successful completion of the Course, student will be able to:

#### A. Knowledge and Understanding:

- |    |                                                                                                                            |
|----|----------------------------------------------------------------------------------------------------------------------------|
| a1 | Identify the basic of pharmacokinetics: orders, models. and parameters. for drug absorption, distribution and elimination. |
| a2 | Explain the differentiate between linear and non-linear pharmacokinetic parameters for drugs.                              |

#### B. Intellectual Skills:

- |    |                                                                                                |
|----|------------------------------------------------------------------------------------------------|
| b1 | Predicts the pharmacokinetics parameters need for adjustment the dose of new drug development. |
|----|------------------------------------------------------------------------------------------------|

#### C. Professional and Practical Skills:

- |    |                                                                                                                               |
|----|-------------------------------------------------------------------------------------------------------------------------------|
| c1 | Calculate the in vivo and in vitro pharmacokinetic parameters relate to bioequivalence drugs evaluation.                      |
| c2 | Utilize pharmacokinetic models to calculate the quantity for drug absorption, distribution, elimination and other parameters. |

#### D. Transferable Skills:

- |    |                                                                                                          |
|----|----------------------------------------------------------------------------------------------------------|
| d1 | Perform tasks and costs of the course independently and be able to work as an effective member in a team |
| d2 | Employ the technologies services to solve problems of pharmaceutical calculation and develop skills.     |

I= Introduced, P=Practiced or M/A= Mastered/Advanced

## V. Course Contents:

### A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1	<b>Introduction to pharmacokinetics</b>	<ul style="list-style-type: none"> <li>• Terminology and definitions</li> <li>• Rates and orders</li> <li>• Kinetic of drug absorption</li> <li>• Compartment models                             <ul style="list-style-type: none"> <li>○ Definition</li> <li>○ Basis of Classification</li> </ul> </li> <li>• Model selection criteria</li> </ul>	2	4
2	<b>One compartment open model</b>	<p>Calculation of the following parameters ( for each model)</p> <ul style="list-style-type: none"> <li>○ Volume of Distribution</li> <li>○ Elimination Rate Constant</li> <li>○ Clearance</li> <li>○ Elimination half life</li> <li>○ AUC</li> <li>○ Concentration at zero time.</li> </ul> <ul style="list-style-type: none"> <li>• One Compartment I.V Bolus                             <ul style="list-style-type: none"> <li>○ Assumptions</li> <li>○ First-order kinetics</li> <li>○ Plasma data</li> <li>○ Area under the Curve</li> <li>○ Half-life</li> </ul> </li> <li>• Pharmacokinetics of Oral Administration                             <ul style="list-style-type: none"> <li>○ Differential Equation</li> <li>○ Integrated Equation</li> <li>○ Absorption Rate Constant (K)                                     <ul style="list-style-type: none"> <li>▪ Wagner nelson</li> <li>▪ Method of residual</li> </ul> </li> <li>○ Extent of Absorption</li> </ul> </li> <li>• Calculation of Bioavailability Parameters:                             <ul style="list-style-type: none"> <li>○ Calculation of Ka</li> <li>○ Calculation of F</li> </ul> </li> <li>• Intravenous Infusion:                             <ul style="list-style-type: none"> <li>○ Continuous infusion – steady state</li> </ul> </li> </ul>	4	8

### Course Specification of: Biopharmaceutics & Pharmacokinetics 2 Code. (PH1124275)

		<ul style="list-style-type: none"> <li>○ Combined infusion and bolus administration</li> <li>○ Combined slow and fast infusion</li> </ul> Post infusion		
3	Midterm exam		1	2
4	Two compartment open model with first order elimination kinetics	Pharmacokinetics of single dose as oral and intravenous (rapid/bolus.) <ul style="list-style-type: none"> <li>● Intravenous infusion</li> <li>● Multiple oral and intravenous administrations.</li> </ul> Pharmacokinetic of sustained releases formulation	2	4
5	Non-linear pharmacokinetics(dose dependent kinetics)	Michaels- Menten's kinetics <ul style="list-style-type: none"> <li>● Pharmacokinetic characteristics.</li> </ul> In-vivo estimation of Km and Vm	2	4
6	Multiple Administration:	Multiple I.V Bolus Dose <ul style="list-style-type: none"> <li>○ Independent doses</li> <li>○ Accumulating doses</li> <li>○ Development of general equation</li> <li>○ C<sub>pmax</sub> and C<sub>pmin</sub> equations</li> </ul> <ul style="list-style-type: none"> <li>● Multiple Oral Dose Administration:               <ul style="list-style-type: none"> <li>○ C<sub>pmin</sub> equation</li> </ul> </li> </ul> Average C <sub>p</sub> equation	2	4
7	Dosage regimen design	<ul style="list-style-type: none"> <li>● <b>Calculation</b> the dose</li> <li>● Calculation dosing interval</li> <li>● Average concentration</li> </ul>	2	4
	Final exam		1	2
Number of Weeks /and Units Per Semester			16	32

**Course Specification of: Biopharmaceutics & Pharmacokinetics 2 Code. (PH1124275)**

## B – Tutorial:

Order	Practical Experiment	Number of weeks	Contact hours
1	Problems solving for Determination the kinetics order	1	2
2	Problems solving to calculate kinetic parameters ( $t_{1/2}$ , $vd$ , $cp^0$ , $cl$ , AUC, $ke$ , $T_{max}$ , $C_{max}$ )	1	2
3	Problem solving for I.V. bolus dosing one compartment	1	2
4	Problem solving for I.V. infusion one compartment	1	2
5	Problem solving for oral dosing one compartment	1	2
6	Calculation of AUC by trapezoidal method	1	2
7	Calculation of $k_a$ by Wagner method	1	2
8	Calculation of $k_a$ by method of residual	1	2
9	Problem solving for I.V. bolus dosing two compartment	1	2
10	Calculation of $k_{12}/k_{21}$ (distribution constant)	1	2
11	Problem solving on dosage regimen kinetics	2	4
12	Final exam	1	2
Number of Weeks/and Units Per First semester3			26

## VI. : Teaching Strategies of the Course:

### (A) (Knowledge and Understanding)

- Lectures and Groups discussion.
- Self – learning

### (B) (Intellectual Skills)

- Dialogue and discussion
- solving Problem

### Course Specification of: Biopharmaceutics & Pharmacokinetics 2 Code. (PH1124275)

### (C) (Professional and Practical Skills)

- Lectures
- Simulation & presentations

### (D) (Transferable Skills)

- Self – learning
- Cooperative learning

## VII. Assessment Methods of the Course:

### (A) (Knowledge and Understanding)

- Quizzes, Presentation and Written exam.

### (B) (Intellectual Skills)

- Quizzes, Homework

### (C) (Professional and Practical Skills)

- Performance, Report

### (D) (Transferable Skills)

- Homework's evaluation.
- Evaluation of Research reports

## VIII. Assignments:

No.	Assignments	Week Due	Mark
1	Assignment 1: Attendance	1-14	10
2	Assignment 2: Homework, Problems & Quizzes.	6&12	10
<b>Total</b>			<b>20</b>

## IX. Schedule of Assessment Tasks for Students During the Semester:

### Course Specification of: Biopharmaceutics & Pharmacokinetics 2 Code. (PH1124275)

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments	1-14	20	20%
2	Mid-Term Theoretical Exam	8	20	20%
3	Mid-term exam practice	7	10	10%
	Final practice exam	13	10	10%
5	Final Theoretical Exam	16	40	40%
Total			100	100%

## X. Learning Resources:

- Written in the following order: Author, Year of publication, Title, Edition, Place of publication, Publisher.

### 1- Required Textbook(s) (maximum two ):

Leon Shargel Andrew (2012). Applied Biopharmaceutics and Pharmacokinetics, Sixth edition, Lippincott's and William, Philadelphia

### 2- Essential References:

- 1- Michel E. Winter (2011). Basic clinical pharmacokinetics, Fifth edition, Lippincott's and William, San Fransisco.

### Websites:

[www.boomer.org](http://www.boomer.org)

## XI. Course Policies: (Based on the Uniform Students' Bylaw (2007))

<b>1</b>	<b>Class Attendance:</b> Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
<b>2</b>	<b>Tardiness:</b> A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
<b>3</b>	<b>Exam Attendance/Punctuality:</b>

### Course Specification of: Biopharmaceutics & Pharmacokinetics 2 Code. (PH1124275)

	No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	<b>Assignments &amp; Projects:</b> Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	<b>Cheating:</b> Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	<b>Forgery and Impersonation:</b> Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	<b>Other policies:</b> The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.

## Course Specification Medicinal Chemistry III

I. Course Identification and General Information:					
١	<b>Course Title:</b>	<b>Medicinal Chemistry III</b>			
٢	<b>Course Code &amp; Number:</b>	PH1124238			
٣	<b>Credit hours:</b>	C.H			TOTAL
		Th.	Seminar	Pr	Tr.
		2		1	
		Credit Hours			3
٤	<b>Study level/ semester at which this course is offered:</b>	Level 4 / 2 <sup>nd</sup> Semester			
٥	<b>Pre –requisite (if any):</b>	Pharmaceutical Organic Chemistry I, II, and III, Pharmacology III			
٦	<b>Co –requisite (if any):</b>				
٨	<b>Program (s) in which the course is offered:</b>	Bachelor of Pharmacy			
٩	<b>Language of teaching the course:</b>	English			
١٠	<b>Location of teaching the course:</b>	Faculty of Medical Sciences			
11	<b>Prepared By:</b>	Assistant Prof. Dr. Sam Dawbaa			
12	<b>Date of Approval</b>				



## II. Course Description:

This course aims to provide the students with a basic knowledge about classification, mechanism of action, chemical properties, structure-activity relationships, and chemical synthesis of drugs used in the treatment of cardiovascular and gastrointestinal diseases.

## III. Course Objectives:

1. To provide the student with basic knowledge regarding the chemical properties and SARs and their contribution to the biological activity of drugs used in the treatment of cardiovascular and gastrointestinal diseases.
2. To explain some methods of chemical synthesis of selected drugs.
3. To compare between classes of drugs in each system.
4. To explain the metabolic pathways of those drugs.

#### IV. Course Intended Learning Outcomes (CILOs) :

##### Knowledge and Understanding:

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

Knowledge and Understanding PILOs	Knowledge and Understanding CILOs	Teaching Strategies
After completing this program, students would be able to:	After completing this course, students would be able to:	Lectures, Discussions, Self-learning.
A1 Explain the relationship between the structural activity relationship (SAR) and its pharmacokinetics and pharmacological activity.	a1: Explain the structure-activity relationship (SAR) of the drugs of the cardiovascular and gastrointestinal systems.	Lectures, Discussions, Self-learning.
A2 Understand the chemistry of drug-receptor interaction.	a2: <ul style="list-style-type: none"> <li>Discuss the relationship between chemical properties and drug activity.</li> <li>Discuss methods of chemical synthesis of selected drugs.</li> </ul>	Lectures, Discussions, Self-learning.
A3: Understand the metabolic pathways of drugs in the body.	a3: <ul style="list-style-type: none"> <li>Explain the metabolism of drugs used in the cardiovascular and gastrointestinal systems.</li> </ul>	Lectures, Discussions, Self-learning.

##### Intellectual Skills :

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

Intellectual Skills PILOs	Intellectual Skills CILOs	Teaching Strategies
After completing this program, students would be able to:	After completing this course, students would be able to:	The following strategies should be used:
B1 Discuss the structure activity relationships (SAR) that control the pharmacokinetics and pharmacodynamics	b1: Identify the structural features of drugs responsible for their therapeutic and adverse effects.	Lectures, Discussions, Seminars, Self-learning.
	b2: Predict the pharmacokinetics of drugs based on their physicochemical properties.	Lectures, Discussions, Seminars, Self-learning.

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

### **Transferable (General) Skills :**

<b>Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)</b>		
<b>Transferable (General) Skills PILOs</b>	<b>Transferable (General) Skills CILOs</b>	<b>Teaching Strategies</b>
After completing this program, students would be able to:	After completing this course, students would be able to:	The following strategies should be used:
D1 Use chemistry-related softwares and search efficiently for medical information from professional medical sites.	d1: To use famous websites used in medicinal chemistry researches including SwissADME, ChemBL, PubChem, Siencedirect, and Google Scholar. d2: Use important software such as ChemDraw, ChemSketch, and has a knowledge about Molecular Docking software.	Discussions, Presentations, Self-learning.

## V. Course Content:

### A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Drugs used in the treatment of cardiovascular disorders	<ul style="list-style-type: none"> <li>• Antianginal drugs: Classes, MOA, uses, adverse effects.</li> <li>• Chemical properties and SARs of related antianginal drugs including organic nitrates, calcium channel blockers, <math>\beta</math>-blockers, and other groups.</li> <li>• Chemical synthesis of some antianginal drugs.</li> <li>• Drugs used in the treatment of myocardial infarction (MI): Classes, MOA, uses, adverse effects, chemical properties and synthesis.</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2
		<ul style="list-style-type: none"> <li>• Antiarrhythmic agents: Classes, MOA, uses, adverse effects.</li> <li>• Chemical properties of related antiarrhythmic drugs including Class I – Class IV drugs.</li> <li>• Chemical synthesis of some antiarrhythmic drugs.</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2
		<ul style="list-style-type: none"> <li>• Agents for Congestive Heart Failure (CHF): Classes, MOA, uses, adverse effects, SARs, chemical properties and synthesis.</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2
2	Diuretics	<ul style="list-style-type: none"> <li>• Classes, MOA, uses, adverse effects.</li> <li>• Chemical properties and SARs of carbonic anhydrase enzyme inhibitors, thiazide &amp; thiazide-like diuretics, loop diuretics.</li> <li>• Chemical properties of mineralocorticoid receptors</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2

		<p>anatagonists, and potassium-sparing diuretics.</p> <ul style="list-style-type: none"> <li>Chemical synthetical methods of some diuretic agents.</li> </ul>			
3	<b>Antihypertensive drugs</b>	<ul style="list-style-type: none"> <li>Classes, MOA, uses, adverse effects, SARs, chemical properties and synthesis of certain antihypertensive agents.</li> </ul>	2	4	a1, a2, a3, b1, b2, d1, d2
4	<b>Drugs for blood disorders</b>	<ul style="list-style-type: none"> <li>Antihyperlipidemic agents</li> <li>Coagulants and anticoagulants</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2
5	<b>Mid-term</b>	Mid-term Exam	1	2	
6	<b>Antihistaminic agents</b>	<ul style="list-style-type: none"> <li>H1-antagonists: Classes, MOA, uses, adverse effects.</li> <li>SARs and chemical properties.</li> <li>Comparison with antimuscarinic agents.</li> <li>Chemical synthesis of some H1-antagonists.</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2
		<ul style="list-style-type: none"> <li>H2-antagonists: Classes, MOA, uses, adverse effects.</li> <li>SARs and chemical properties.</li> <li>Chemical synthesis of some H1-antagonists</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2
7	<b>Drugs of the gastrointestinal system</b>	<ul style="list-style-type: none"> <li>Agents for peptic ulcers: Classes, MOA, uses, adverse effects.</li> <li>SARs of proton-pump inhibitors</li> <li>Chemical properties of antacids, misoprostol, and sucralfate.</li> <li>Chemical synthesis of selected drugs.</li> </ul>	2	4	a1, a2, a3, b1, b2, d1, d2
		<ul style="list-style-type: none"> <li>Emetics and antiemetics.</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2
		<ul style="list-style-type: none"> <li>Laxatives and antidiarrheal agents.</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2
		<ul style="list-style-type: none"> <li>Drugs used in liver diseases</li> </ul>	1	2	a1, a2, a3, b1, b2, d1, d2

<b>Final Exam</b>	Final	1	2	
<b>Number of Weeks /and Units Per Semester</b>			<b>16</b>	<b>32</b>

<b>B – Case Studies and Practical Aspect: (if any)</b>				
Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Introduction to the organic synthesis of drugs: reaction equipment assembly	1	2	c1, c2, d1, d2
2	Chemical synthesis of benzofuran ring	1	2	c1, c2, d1, d2
3	Chemical synthesis of indole ring	1	2	c1, c2, d1, d2
4	Chemical synthesis of 5-membered rings	1	2	c1, c2, d1, d2
5	Chemical synthesis and assay of selected drugs	1	2	c1, c2, d1, d2
6	Chemical synthesis: using SN reactions in the synthesis of selected drug	1	2	c1, c2, d1, d2
7	Chemical synthesis: using SN reactions in the synthesis of selected drug	1	2	c1, c2, d1, d2
8	Hydrolysis of esters: application on a selected drug	1	2	c1, c2, d1, d2
9	Chemical synthesis and assay of selected drugs	1	2	c1, c2, d1, d2
10	Introduction: methods of purification of synthesized drugs	1	2	c1, c2, d1, d2
11	Purification of a selected drug by recrystallization	1	2	c1, c2, d1, d2
12	Purification of a selected drug by recrystallization	1	2	c1, c2, d1, d2
13	Purification of a selected drug by chromatographic methods	1	2	c1, c2, d1, d2
14	Purification of a selected drug by chromatographic methods	1	2	c1, c2, d1, d2
15	Final Exam	1	2	
<b>Number of Weeks /and Units Per Semester</b>		<b>15</b>	<b>30</b>	

## VI. Teaching strategies of the course:

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

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments (Homework and class discussion activity)	1-12	5	5%	a1,a2,
2	Quiz 1	4	2.5	2.5%	a1,a2, ,b1,b2
3	Mid-semester exam of theoretical part (written exam)	8	10	10%	c1,c2,
4	Quiz 2	12	2.5	2.5%	c1,c2,
5	Lab. Term	1-14	5	5%	c1, c2,d1,d2
6	works		5	5%	
7	Final exam (practical)	15	20	20%	c1, c2,d1,d2
8	Final exam of theoretical part	16	50	50%	a1,a2,b1,b2,c1, d1,d2
Total			100	100%	

## VIII. Learning Resources:

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

1. Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, 13<sup>th</sup> edition, J. N. Delgado and W. A. Remers, Lippincott, 2017.
2. Foye's Principles of Medicinal Chemistry, 7<sup>th</sup> edition, Thomas L. Lemke and David A. Williams, Lippincott Williams & Wilkins, 2013.

## 2- Essential References.

1. An Introduction to Medicinal Chemistry, 5<sup>th</sup> edition, Graham Patrick, Oxford University Press, 2013.
2. Kar, A. (2007). Advanced practical medicinal chemistry. New Age International.
3. Pedersen, O. (2006). Pharmaceutical Chemical Analysis: Methods for Identification and Limit Tests. Ukraine: CRC Press.

## 3- Electronic Materials and Web Sites *etc.*

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

<https://orgsyn.org/>

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

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

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

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





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



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

## Faculty of Medical Sciences

Department of Pharmacy

Program of Bachelors Pharmacy

# Course Specification of Phytotherapy and complementary medicine Course Code. (PH1124247)

2024



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

## I. Course Identification and General Information:

1	Course Title:	<i>Phytotherapy</i>				
2	Course Code & Number:	<b>PH1124247</b>				
3	Credit hours:	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2				2
4	Study level/ semester at which this course is offered:	<i>Fourth level/ 2<sup>nd</sup> semester</i>				
5	Pre –requisite (if any):	<i>Pharmacognosy and phytochemistry</i>				
6	Co –requisite (if any):					
7	Program (s) in which the course is offered:	<i>Bachelor of Pharmacy</i>				
8	Language of teaching the course:	<i>English</i>				
9	Study System	<i>Semester</i>				
10	Mode of delivery:	<i>Regular</i>				
11	Location of teaching the course:	<i>Faculty of Medical Sciences, Thamar University campus</i>				
12	Prepared By:	<i>Dr. Abdulkarim Kassem Alzomor Dr. Aref Aiz Aldeen Al-Senway</i>				
13	Date of Approval					

## II. Course Description:

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

**Course Specification of: *Phytotherapy and complementary medicine* Code. (PH1124247)**

### III. Intended learning outcomes (ILOs)

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

**Course Specification of: *Phytotherapy and complementary medicine* Code. (PH1124247)**

<b>(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:</b>		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
<p><b>a1-</b> Know the basic principles of phytotherapy and diseases and the way of treatment by medicinal plants.</p> <p><b>a2-</b> Identifies the physical and chemical properties and the relationship between the activity and toxic effect of the active ingredients.</p> <p><b>a3-</b> Correctly choose the methods of extraction of effective substances from plants.</p> <p><b>a4-</b> Determine the pathological condition, symptoms and the medicine derived plant used in the treatment.</p>	<ul style="list-style-type: none"> <li>- Lectures and Groups discussion.</li> <li>- Practical presentations</li> <li>- Self - learning.</li> </ul>	Quizzes, Written exam.

<b>(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:</b>		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
<p><b>b1.</b> Accurately suggest of the correct medicinal plants used for the treatment for various diseases.</p> <p><b>b2-</b> Distinguish between the rational use or misuse for medicinal plants.</p>	<ul style="list-style-type: none"> <li>- Discussions and Training</li> <li>- Field visits</li> <li>- Problem solving</li> </ul>	<ul style="list-style-type: none"> <li>- Quizzes, Homework</li> <li>- Observation</li> <li>- Task's Evaluates</li> </ul>

<b>(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:</b>		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
<p><b>c1.</b> Correctly uses the terminologies and abbreviations and others</p>	<ul style="list-style-type: none"> <li>- Discussions and Training</li> <li>- Field visits</li> </ul>	<ul style="list-style-type: none"> <li>- Quizzes, Homework</li> <li>- Observation</li> </ul>

symbols. <b>c2.</b> Effectively communicate with patients and the healthcare team about the safety use of medicine.	- Problem solving	- Task's Evaluates
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**(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:**

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
<b>d1.</b> Works effectively with team,	- Group discussions - Cooperative learning. - Self – learning - Inductive and deductive	- Homework - Evaluates of Oral Presentation

**IV. Course Content:**

**A – Theoretical Aspect:**

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
<b>1</b>	<b>Introduction To CAM</b>	a1, a2,a3,a4, b1, b2, c1,c2,d1	Aim of the course traditional systems of herbal medicine Chinese, Ayurveda and Islamic	1	2
<b>2</b>	<b>Herbal medicine</b>	a1, a2,a3,a4, b1, b2, c1,c2,d1	pharmacological and therapeutical activity of the plants constituents	1	2
<b>3</b>	phytotherapy of disorders of respiratory system	a1, a2,a3,a4, b1, b2, c1,c2,d1	– hinitis definition ,symptoms ,causes and treatment – Sinusitis definition ,symptoms ,causes and treatment Cough definition ,symptoms	2	4

**Course Specification of: *Phytotherapy and complementary medicine* Code. (PH1124247)**

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

**Course Specification of: *Phytotherapy and complementary medicine* Code. (PH1124247)**

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

## V. Teaching strategies of the course:

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

## VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Class attendance and participation	a1, a2,a3,a4, b1, b2, c1,c2,d1	weekly	5
2	Homework, presentation	a1, a2,a3,a4, b1, b2, c1,c2,d1	11	5

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes

**Course Specification of: *Phytotherapy and complementary medicine* Code. (PH1124247)**

1	Assignments	1-14	10	10%	a1, a2,a3,a4, b1, b2, c1,c2,d1
2	Quizzes 1	6	5	5%	a1, a2,a3,a4, b1, b2, c1,c2,d1
3	Mid-semester exam of theoretical part ( written exam	8	20	20%	a1, a2,a3,a4, b1, b2, c1,c2,d1
	Quizzes 2	12	5	5%	a1, a2,a3,a4, b1, b2, c1,c2,d1
7	Final exam of theoretical part ( written exam)	16	60	60%	a1, a2,a3,a4, b1, b2, c1,c2,d1
<b>Total</b>			100	100%	

## VIII. Learning Resources

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

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

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

### 2- Essential References.

1- Jean Bruneton ,2008, pharmacognosy ,phytochemistry,and medicinal plants 3<sup>rd</sup> ed

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

### 3- Electronic Materials and Web Sites etc.

## IX.Course Policies:

1.	<b>Class Attendance:</b> At least 75 % of the course hours should be attended by the student. Otherwise, he/she will not be allowed to attend the final exam
2.	<b>Tardy:</b> any student who is late for more than 15 minutes from starting the lecture will not be allowed to attend the lecture and will be considered absent.
3.	<b>Exam Attendance/Punctuality:</b> any student who is late for more than 30 minutes from starting the examwill not be allowed to attend the exam and will be considered absent.

### Course Specification of: *Phytotherapy and complementary medicine* Code. (PH1124247)



4.	<b>Assignments &amp; Projects:</b> Assignments and projects will be assessed individually unless the teacher request for group work
5	<b>Cheating:</b> Cheating by any means will cause the student failure and he/she must re-study the course
6	<b>Plagiarism:</b> Plagiarism by any means will cause the student failure in the course . Other disciplinary procedures will be according to the college rules.

## Faculty of Medical Sciences

Department of Pharmacy

Program of Bachelors Pharmacy

# Course Plan (Syllabus) of Phytotherapy and complementary medicine Course Code. PH1124247

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

2024

Course Specification of: *Phytotherapy and complementary medicine* Code. (PH1124247)

I. Course Identification and General Information:					
1-	Course Title:	Phytotherapy and complementary medicine			
2-	Course Number & Code:	PH1124247			
3-	Credit hours:	C.H			Total
		Th.	Seminar	Pr.	
		2			2
4-	Study level/year at which this course is offered:	Fourth level/ 2 <sup>nd</sup> semester			
5-	Pre –requisite (if any):	Pharmacognosy and phytochemistry			
6-	Co –requisite (if any):				
7-	Program (s) in which the course is offered	General Pharmacy and PharmD			
8-	Language of teaching the course:	English /Arabic			
9-	System of Study:	Semester			
10-	Mode of delivery:	Regular			
11-	Location of teaching the course:	Thamar University campus			

## II. Course Description:

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

**Course Specification of: *Phytotherapy and complementary medicine* Code. (PH1124247)**

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

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

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

### IV. Course Content:

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

#### A – Theoretical Aspect:

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

**Course Specification of: *Phytotherapy and complementary medicine* Code. (PH1124247)**

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

**Course Specification of: *Phytotherapy and complementary medicine* Code. (PH1124247)**

## V. Teaching strategies of the course:

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

## VI. Assignments:

No	Assignments	Week Due	Mark
1	Class attendance and participation	weekly	5
2	Homework, presentation	11	5

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments	1-16	10	10%
2	Quizzes 1	6	5	5%
3	Mid-semester exam of theoretical part ( written exam	8	20	20%
	Quizzes 2	12	5	5%
7	Final exam of theoretical part ( written exam)	16	60	60%
<b>Total</b>			100	100%

## IX. Learning Resources

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

- 1-Henrich M ,Barens j,and Gibbons S,A,2004"Fundamentals of pharmacognosy and phytotherapy",,Chrchill Livingstone ,New York.
- 2-Iqbal R .Phytotherapies ;efficacy ,safety ,regulation.2015 by John WILEY and Sons, Inc, Canada

### 2- Essential References.

- 1- Jean Bruneton ,2008, pharmacognosy ,phytochemistry,and medicinal plants 3<sup>rd</sup> ed
- 2- Brun L, and Cohen M,2010"Herbs and Natural supplements "2010 3<sup>rd</sup> ed ,Elsevier, London

### 3- Electronic Materials and Web Sites etc.

## X. Course Policies:

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

## Course Specification

### Pharmacology IV

I. Course Identification and General Information:					
1	Course Title:	Pharmacology IV			
2	Course Code &Number:	PH1124256			
3	Credit hours: 3	C.H			TOTAL
		Th.	Seminar	Pr	
		2	0		0
4	Study level/ semester at which this course is offered:	Level 4/ semester2			
5	Pre –requisite (if any):	Physiology, Pharmacology 1, Pharmacology 2			
6	Co –requisite (if any):				
7	Program (s) in which the course is offered:	Bachelor of Pharmacy			
8	Language of teaching the course:	English			
9	Location of teaching the course:	Thamar University - Faculty of Medical Sciences			
10	Prepared By:	Dr. Ahmed G. Al- Akydy – Dr. Ahmed Al-Washli			
11	Date of Approval	2021			



## II. Course Description:

This course is a complementary study to what has been studied in pharmacology 3. This course will be offered students with knowledge of the therapeutic uses, adverse effects and drug interactions in both clinical pharmacy practice in the area of pharmacology of chemotherapeutic agents, which involve: antibacterial, Antiprotozoal, antihelmenthic, antiviral, antifungal, anticancer, as well as, Immunopharmacology agents

## III. Course Objectives:

**The overall aims of the course are:**

1. To raise knowledge of student about commonly used drugs to treat infectious diseases and neoplasms .
2. To build knowledge about the drugs used in the treatment of bacterial, viral, protozoal, helminthic infections and cancer.
3. To identify the mechanism, therapeutic uses, side effects/toxicity, contraindications, and interactions of the major classes acting use in the treatment of infectious diseases and malignances.

#### IV. Course Intended Learning Outcomes (CILOs) :

##### Knowledge and Understanding:

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

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

a1 Classify the various organisms and determine drugs that use in the treatment of each microorganism.

a2 **Enumerate** the different categories of agents that use in the treatment of neoplasm.

a3 **Explain** in detail the mechanisms of action, therapeutic uses, contraindications and adverse effects of commonly prescribed drugs used in the treatment of microorganisms, cancer and immune –induced diseases

Knowledge and Understanding PILOs		Knowledge and Understanding CILOs	
After completing this program, students would be able to:		After completing this course, students would be able to:	
A1	Explain the fundamentals of general sciences and the basic and biomedical sciences and their relations to pharmacy profession.		
A2	Illustrate the fundamentals of social and behavioral sciences relevant to pharmacy, ethics of health care and its impact on their relationship with patients and other healthcare professionals.		
A3	Describe relationships between chemical structure of compounds of pharmaceutical and medicinal interest and biological activities	a1	Classify the various organisms and determine drugs that use in the treatment of each microorganism.
		a2	<b>Enumerate</b> the different categories of agents that use in the treatment of neoplasm
A4	Define basic principles of drug: target identification, design, informatics, and mechanisms of action	a3	<b>Explain</b> in detail the mechanisms of action, therapeutic uses, contraindications and adverse effects of commonly prescribed drugs used in the treatment of microorganisms, cancer and immune –induced diseases
A5	Outline principles of clinical pharmacology, therapeutics and Pharmacovigilance.		

Intellectual Skills :			
Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)			
<p><b>b1 Select</b> appropriate management strategy for patients in the treatment various clinical conditions, including infectious diseases, malignant tumors, immunological origin diseases.</p> <p><b>b2 determine</b> the appropriate dosage form and the appropriate route of administration of drugs in the treatment of cancer and infectious diseases</p> <p><b>b2 Evaluate</b> and manage the problems related to drugs used in the treatment of cancer and infectious diseases.</p>			
Intellectual Skills PILOs		Intellectual Skills CILOs	
After completing this program, students would be able to:		After completing this course, students would be able to:	
<b>B1</b>	Classify the synthetic and natural drugs according to their mechanism of action, systemic effect, therapeutic uses, contraindication and toxicity	<b>b1</b>	<b>b1 Select</b> appropriate management strategy for patients in the treatment various clinical conditions, including infectious diseases, malignant tumors, immunological origin diseases.
<b>B2</b>	Design risk reduction strategies to ensure patient safety and prevent medication errors, drug interaction, and adverse drug effects,	<b>b3</b>	<b>Evaluate</b> and manage the problems related to drugs used in the treatment of cancer and infectious diseases.
<b>B3</b>	Solve problems to reduce drug therapy problems	<b>b3</b>	<b>Evaluate</b> and manage the problems related to drugs used in the treatment of cancer and infectious diseases.
<b>B4</b>	Select drug therapy regimen using mathematical, genomic, clinical pharmacokinetic and pharmacodynamics principles for optimizing the patient therapy and medication safety	<b>b2</b>	<b>determine</b> the appropriate dosage form and the appropriate route of administration of drugs in the treatment of cancer and infectious diseases

### Professional and Practical Skills

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

c1 Apply the knowledge with the clinical skills in diagnoses of the different infectious and cancer diseases to present the proper treatment

c2 **Calculate** and **adjust** drug dosage and dose regimen of drugs that used in the treatment of cancer, and infectious diseases.

c3 **Manage** problems that result from chemotherapeutic drugs, and drugs affecting immune system.

Professional and Practical Skills PILOs		Professional and Practical Skills CILOs	
After completing this program, students would be able to:		After completing this course, students would be able to:	
C1	Handle the chemical, biological, and pharmaceutical materials safely		
C2	Operate different pharmaceutical equipment and instruments		
C3	Extract active substances from different sources.		
C4	Carry outpatient physical assessment.	c1	c1 Apply the knowledge with the clinical skills in diagnoses of the different infectious and cancer diseases to present the proper treatment
C5	Advise the patients and health care professionals for optimizing medicines use.	c2	<b>Calculate</b> and <b>adjust</b> drug dosage and dose regimen of drugs that used in the treatment of cancer, and infectious diseases.
		c3	<b>Manage</b> problems that result from chemotherapeutic drugs, and drugs affecting immune system.

### Transferable (General) Skills :

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

- d1 Use different sources to obtain information and knowledge  
d2 Work effectively either individually or within a team, considering legalizations and ethics of pharmacy profession  
d3 Manage time Efficiently

Transferable (General) Skills PILOs		Transferable (General) Skills CILOs	
After completing this program, students would be able to:		After completing this course, students would be able to:	
D1	Communicate effectively and ethically with patients, public, and health care professionals.	d2	Work effectively either individually or within a team, considering legalizations and ethics of pharmacy profession
D2	Use information systems and computer softwares in order to enhance the delivery of pharmaceutical care,	d1	Use different sources to obtain information and knowledge
D3	Work effectively individually and in a team	d2	Work effectively either individually or within a team, considering legalizations and ethics of pharmacy profession
D4	Have the skills of decision-making and time management and lifelong learning	d3	Manage time Efficiently

## V. Alignment Course Intended Learning Outcomes

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

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
a1	a1 Classify the various organisms and determine drugs that use in the treatment of each microorganism.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Discussion Sessions</li> <li>Assignments</li> </ul>	<ul style="list-style-type: none"> <li>Periodic exam (Quizzes)</li> <li>Evaluate assignments</li> <li>Mid &amp; final exam</li> </ul>
a2	<b>Enumerate</b> the different categories of ag that use in the treatment of neoplasm.		
a3	<b>Explain</b> in detail the mechanisms of action, therapeutic uses, contraindications and adverse effects of commonly prescribed drugs used in the treatment of microorganisms, cancer and immune –induced diseases		

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

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
b1	<b>b1 Select</b> appropriate management strategy for patients in the treatment various clinical conditions, including infectious diseases, malignant tumors, immunological origin diseases.	<ul style="list-style-type: none"> <li>Discussion Sessions</li> <li>Problem solving</li> <li>Group discussion</li> <li>Assignments</li> </ul>	<ul style="list-style-type: none"> <li>Oral presentations</li> <li>Evaluate assignments</li> <li>Mid &amp; final exam</li> </ul>
b2	<b>determine the appropriate dosage form and the appropriate route of administration of drugs in the treatment of cancer and infectious diseases</b>		
b3	<b>Evaluate</b> and manage the problems related to drugs used in the treatment of cancer and infectious diseases.		

**(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	c1 Apply the knowledge with the clinical skills in diagnoses of the different infectious and cancer diseases to present the proper treatment	<ul style="list-style-type: none"> <li>• Discussion sessions</li> <li>• Assignments</li> </ul>	<ul style="list-style-type: none"> <li>• Oral presentations</li> <li>• Theory &amp; Practical exams</li> <li>• LAB report</li> <li>• Evaluate assignments</li> </ul>
c2	<b>Calculate</b> and <b>adjust</b> drug dosage and dose regimen of drugs that used in the treatment of cancer, and infectious diseases.		
c3	<b>Manage</b> problems that result from chemotherapeutic drugs, and drugs affecting immune system.		

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

Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
d1	Use different sources to obtain information a knowledge	<ul style="list-style-type: none"> <li>• Discussion Sessions</li> <li>• Assignments that require collecting information from the internet.</li> </ul>	<ul style="list-style-type: none"> <li>• Oral presentations</li> <li>• Writing</li> </ul>
d2	Work effectively either individually or within a team, considering legalizations and ethics of pharmacy profession		
d3	Manage time Efficiently		

**V. Course Content:**

**A – Theoretical Aspect:**

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	<b>Chemotherapeutic</b>	- Introduction into antimicrobial drugs	1W	2	a1; c1; d1

	drugs				d3;d1	
		- Cell wall synthesis inhibitors - Penicillins	1W			a1; a3; b1; b2;b3; c1; c2;c3; d1
		- <b>Cell wall synthesis inhibitors</b> o Cephalosporins, o Carbapenems o Monobactam	1W	2		a1; a3; b1; b2;b3; c1; c2;c3;d1
		- Other cell wall synthesis inhibitors				
		- <b>Protein synthesis inhibitors</b> - Tetracyclines, Chloramphenicol, Macrolides, lincosamide, Streptogramins, Oxazolidinones	1W	2		a1; a3; b1; b2;b3; c1; c2;c3; d1
		- <b>Protein synthesis inhibitors</b> - Aminoglycosides	1W	2		a1; a3; b1; b2;b3; c1; c2;c3; d1
		- <b>Sulphonamides</b> , Trimethoprim - <b>Quinolones</b>	1W	2		a1; a3; b1; b2;b3; c1; c2;c3;d1
2		- Drugs used for tuberculosis and leprosy	1W	2		a1; a3; b1; b2;b3; c1; c2;c3; d1
		- Antiprotozoal drugs: amoebiasis, giardiasis, Leishmaniasis,	1W	2		a1; a3; b1; b2;b3; c1; c2;c3;d1
		- Antiprotozoal drugs: malaria, toxoplasmosis, Trypanosomiasis				a1; a3; b1; b2;b3; c1; c2;c3; d1
3		- Anthelmintic drugs	1W	2		a2; a3; b1; b2;b3 ; c1; c2;c3;d1
		- Anti fungal agents.	1W	2		a2; a3; b1; b2;b3; c1; c2;c3; d1



		- Antiviral agents.	1W	2	a2; a3; b1; b2;b3; c1; c2;c3;d1
		- Chemotherapy of cancer	1W	2	a2; a3; b1; b2;b3; c1; c2;c3;d1
4	Immunopharmacology	- Immunomodulators	1W	2	a3; b1; c3;d1
<b>Number of Weeks /and Units Per Semester</b>			<b>14</b>	<b>28</b>	

## VI. Teaching strategies of the course:

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

VII. Assignments:				
No	Assignments	Mark	Week Due	Aligned CILOs(symbols)
1	Participation	5	Weekly	a1; a2; a3; b1; b2; c2; c3
2	Quizzes	5	Weekly	a1; a2; a3; b1; b2;c2; c3
3	Research	5	6 <sup>th</sup> W	a1; a3; b1; b2; b3; c2; c3; d1; d1; d3
4	Assignments	5	6 <sup>th</sup> W	a1; a2; a3; b1; b2;c1;c2; d1; d3
5	Mid – Exam (theoretical)	20	7 <sup>th</sup> W	a1; a2; a3; b3; c2
	<b>Total score</b>	<b>40%</b>		

VIII. Schedule of Assessment Tasks for Students During the Semester:					
No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments & Homework, Tasks & Presentation	Fortnightly	10	10%	a1; a2; a3; b1; b2;c1;c2; d1; d3
2	Quizzes	W6	5	5%	a1; a2; a3; b1; b2;c2; c3
3	Mid-Term exam	W8	20	20%	a1; a2; a3; b3; c2
4	Practical reports	W12	5	5%	a1; a2; a3; b3; c1; c2; c3, d1
6	Final Exam theory	W16	60	60%	a1; a2; a3; b3; c2
<b>Total</b>			<b>100</b>	<b>100%</b>	

## IX. Learning Resources:

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

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

- 1) Katzung B.G., Trevor A.J., (2015). Basic & Clinical Pharmacology(13Ed); McGraw-Hill Education, New York.
- 2) Whalen K.; Feild C., Radhakrishnan R.(2019). Lippincott Illustrated Reviews Pharmacology, (7Ed). Wolters Kluwer, New York.

### 2- Essential References.

- 1) Ritter J.M., Flower R., Henderson G., Loke Y.K., Mac Ewan D. (2020). Rang and Dale's Pharmacology (9 Ed). Elsevier Ltd, United Kingdom.
- 2) Brunton L.L., Chabner B.A., Knollmann B.C. ( 2011). Goodman & Gilman's The Pharmacological Basis of Therapeutics (12 Ed). McGraw-Hill companies, Inc. New York.

### 3- Electronic Materials and Web Sites etc.

- <http://www.jpharmacol.com>
- <http://www.cvpharmacology.com>
- <http://www.fda.gov>

## Course Specification of **Pharmacy Practice 2**

I. Course Identification and General Information:					
١	<b>Course Title:</b>	Pharmacy Practice II			
٢	<b>Course Code &amp; Number:</b>	PH1124257			
٣	<b>Credit hours:</b>	C.H			TOTAL
		Th.	Seminar	Pr	
				2	
٤	<b>Study level/ semester at which this course is offered:</b>	4 <sup>th</sup> Level / 2 <sup>nd</sup> Semester			
٥	<b>Pre –requisite (if any):</b>				
٦	<b>Co –requisite (if any):</b>				
٨	<b>Program (s) in which the course is offered:</b>	Bachelor of Pharmacy			
٩	<b>Language of teaching the course:</b>	English			
١٠	<b>Location of teaching the course:</b>	Thamar University - Faculty of Medical Sciences			
11	<b>Prepared By:</b>				
12	<b>Date of Approval</b>				

### II. Course Description:

This course focus on institutional and community pharmacy practices, the provision not only of the drug required but also the necessary services (before, during or after treatment) to assure optimally safe and effective therapy. Also describing and defining the disease pathophysiology and the appropriate therapeutic interventions and information required to treat different systemic diseases related as musculoskeletal , hormone, kin ,eye and ear problems. In addition to the appropriate therapeutic interventions during pregnancy and lactation periods and some specific product requests.

### III. Course Objectives:

1. To Know the different pharmacy services within the hospital and the methods of and methods of drug distribution, patient counseling I.V. admixture unit.
2. To Illustrate the importance of pharmaceutical skills to the pharmacy profession such as, drug information, drug therapy monitoring.
3. To learn the applications of drugs in the treatment of different diseases

### I. Course Intended Learning Outcomes (CILOs) :

#### Knowledge and Understanding:

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

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

- a1. Understand the basic principles of pharmacy practice and its applications both in community and hospital pharmacy.
- a2. Identify the therapeutic drug monitoring of some drug that used in the management of different systemic disorders.
- a2. Describe the role of the pharmacist for understanding the effects of drugs on fetus during different stages of pregnancy and contraindicated drugs in pregnant and lactating mothers..

#### 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:

<b>A1</b>	Explain the fundamentals of general sciences and the basic and biomedical sciences and their relations to pharmacy profession.	a1	Understand the basic principles of pharmacy practice and its applications both in community and hospital pharmacy.
<b>A2</b>	Illustrate the fundamentals of social and behavioral sciences relevant to pharmacy, ethics of health care and its impact on their relationship with patients and other healthcare professionals.		
<b>A3</b>	Describe relationships between chemical structure of compounds of pharmaceutical and medicinal interest and biological activities		

A4	Define basic principles of drug: target identification, design, informatics, and mechanisms of action		
A5	Outline principles of clinical pharmacology, therapeutics and Pharmacovigilance.	a2	<b>Identify</b> the therapeutic drug monitoring of some drug that used in the management of different systemic disorders.
		a3	Describe the role of the pharmacist for understanding the effects of drugs on fetus during different stages of pregnancy and contraindicated drugs in pregnant and lactating mothers. .

<b>Intellectual Skills :</b>			
<b>Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)</b>			
b1. Select the proper methods to ensure safe application of drugs that used in the management of disorders related to musculoskeletal , hormone, kin ,eye and ear problems.			
b2.assess possible drug interactions and other prescription related problems for drugs that used in the treatment of different disorders an suggest the proper resolution for them			
b3. Integrate a suitable therapeutic plan for special patients like pregnant and lactating women.			
Intellectual Skills PILOs		Intellectual Skills CILOs	
<b>After completing this program, students would be able to:</b>		<b>After completing this course, students would be able to:</b>	
<b>B1</b>	Classify the synthetic and natural drugs according to their mechanism of action, systemic effect, therapeutic uses, contraindication and toxicity		
<b>B2</b>	Design risk reduction strategies to ensure patient safety and prevent medication errors, drug interaction, and adverse drug effects,	b2	assess possible drug interactions and other prescription related problems for drugs that used in the treatment of different disorders an suggest the proper resolution for them
<b>B3</b>	Solve problems to reduce drug therapy problems		

<b>B4</b>	Select drug therapy regimen using mathematical, genomic, clinical pharmacokinetic and pharmacodynamics principles for optimizing the patient therapy and medication safety	<b>b1</b>	<b>Select</b> the proper methods to ensure safe application of drugs that used in the management of disorders related to musculoskeletal , hormone, kin ,eye and ear problems.
		<b>b3</b>	Integrate a suitable therapeutic plan for special patients like pregnant and lactating women.

### Professional and Practical Skills

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

- c1. Apply good pharmacy practice in the appropriate applications of drug pharmacokinetic which help in individual drug dosing and drug monitoring.
- c2. Counsel patients about their disease, instructions about diet, missed dose, for both prescription and OTC drugs to ensure safe use of medications.
- c3. Design patient monitoring plan, and clinical intervention for drug therapy problems to achieve the most effective, most safe, and economic drug regimen.

#### Professional and Practical Skills PILOs

#### Professional and Practical Skills CILOs

After completing this program, students would be able to:

After completing this course, students would be able to:

- |    |                                                                      |
|----|----------------------------------------------------------------------|
| C1 | Handle the chemical, biological, and pharmaceutical materials safely |
| C2 | Operate different pharmaceutical equipment                           |

	and instruments		
C3	Extract active substances from different sources.		
C4	Carry outpatient physical assessment.		
C5	Advise the patients and health care professionals for optimizing medicines use.	c1	Apply good pharmacy practice in the appropriate applications of drug pharmacokinetic which help in individual drug dosing and drug monitoring.
		c2	Design patient monitoring plan, and clinical intervention for drug therapy problems to achieve the most effective, most safe, and economic drug regimen.
		c3	Design patient monitoring plan, and clinical intervention for drug therapy problems to achieve the most effective, most safe, and economic drug regimen.

**Transferable (General) Skills :**

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

- d1. Interact effectively with patients, the public and health care professionals; including communication, interpretation and presentation of applications of drugs both written and oral
- d2. Advise the patients and other health care professionals about safe and proper use of medicines
- d3. Work effectively in a team in a variety of health care settings.

**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** Interact effectively with patients, the public and health care professionals; including communication, interpretation and



			presentation of applications of drugs both written and ora
<b>D2</b>	Use information systems and computer softwares in order to enhance the delivery of pharmaceutical care,	<b>d2</b>	Advice the patients and other health care professionals about safe and proper use of medicines
<b>D3</b>	Work effectively individually and in a team	<b>d3</b>	Work effectively in a team in a variety of health care settings.
<b>D4</b>	Have the skills of decision-making and time management and lifelong learning		

<b>II. Alignment Course Intended Learning Outcomes</b>			
<b>(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:</b>			
Course Intended Learning Outcomes		Teaching strategies	Assessment Strategies
<b>a1</b>	<b>Understand</b> the basic principles of pharmacy practice and its applications both in community and hospital pharmacy.	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Discussion Sessions</li> <li>• Assignments</li> </ul>	<ul style="list-style-type: none"> <li>• Periodic exam (Quizzes)</li> <li>• Evaluate assignments</li> <li>• Mid &amp; final exam</li> </ul>
<b>a2</b>	<b>Identify</b> the therapeutic drug monitoring of some drug that used in the management of different systemic disorders.		
<b>a3</b>	<b>Describe</b> the role of the pharmacist for understanding the effects of drugs on fetus during different stages of pregnancy and contraindicated drugs in pregnant and lactating mothers..		

<b>(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:</b>			
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies	
b1	<ul style="list-style-type: none"> <li>• Discussion Sessions</li> <li>• Problem solving</li> <li>• Group discussion</li> <li>• Assignments</li> </ul>	<ul style="list-style-type: none"> <li>• Oral presentations</li> <li>• Evaluate assignments</li> <li>• Mid &amp; final exam</li> </ul>	
b2			<p><b>Select</b> the proper methods to ensure safe application of drugs that used in the management of disorders related to musculoskeletal , hormone, kin ,eye and ear problems.</p>
b3			<p><b>assess</b> possible drug interactions and other prescription related problems for drugs that used in the treatment of different disorders an suggest the proper resolution for them</p> <p><b>Integrate</b> a suitable therapeutic plan for special patients like pregnant and lactating women</p>

<b>(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:</b>			
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies	
c1	<ul style="list-style-type: none"> <li>• Discussion sessions</li> <li>• Assignments</li> </ul>	<ul style="list-style-type: none"> <li>• Oral presentations</li> <li>• Theory &amp; Practical exams</li> <li>• LAB report</li> <li>• Evaluate assignments</li> </ul>	
c2			<p><b>Apply</b> good pharmacy practice in the appropriate applications of drug pharmacokinetic which help in individual drug dosing and drug monitoring.</p>
c3			<p><b>Counsel</b> patients about their disease, instructions about diet, missed dose, for both prescription and OTC drugs to ensure safe use of medications.</p> <p><b>Design</b> patient monitoring plan, and clinical intervention for drug therapy problems to achieve the most effective, most safe, and economic drug regimen</p>

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

Assessment Strategies:			
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies	
d1	<ul style="list-style-type: none"> <li>Discussion Sessions</li> <li>Assignments that require collecting information from the internet.</li> </ul>	<ul style="list-style-type: none"> <li>Oral presentations</li> <li>Writing</li> </ul>	
d2			<p><b>Interact</b> effectively with patients, the public and health care professionals; including communication, interpretation and presentation of applications of drugs both written and oral</p>
d3			<p><b>Advice</b> the patients and other health care professionals about safe and proper use of medicines</p> <p><b>Work</b> effectively in a team in a variety of health care settings.</p>

V. Course Content:					
A – Theoretical Aspect:					
Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Introduction to pharmacy practice		1w	2	a1; c1
	Applications and therapeutic considerations in musculoskeletal conditions	<ul style="list-style-type: none"> <li>- Acute back pain</li> <li>- Activity- related/sports- related soft tissue injuries</li> </ul>	1w	2	a1; a2; b1; c2; c3; d1; d3
7	Applications and therapeutics considerations in:	- Common eye disorders	1w	2	a1; a2; b1; c2; c3; d1; d3
		- Common ear disorders	1w	2	a1; a2; b1; c2; c3; d1; d3
		- Common skin disorders	1w	2	a1; a2; b1; c2; c3; d1; d3
	Seminar		1w	2	a2; a3; b1; b2; c2; c3;

					d1; d3
8	Applications and therapeutic considerations in women's health	- Pregnancy - Lactation	1w	2	a3; b3; c1; c2; d2
10		- Menstrual disturbances - Vaginal problems	1w	2	a1; a2; a3; b1; b3; c2; c3; d1; d3
		- Contraceptive devices - Emergency hormonal contraception	1w	2	a3; d3; b1; b3; c1; d2
11	Seminar		1w	2	a2; a3; b1; b2; b3; c2; c3;d1; d3
13	Applications and therapeutics considerations in.	- Hormone disorders	1w	2	a1; a2; b1; c2; c3; d1; d3
14	Specific product requests	- Nutritional supplements	1w	2	a1; a3; c1; c2; c3; d1; d3
		- Nicotine replacement therapy	1w	2	a1; a2; b1; c2; c3; d1; d3
	Seminar		1w	2	a2; a3; b1; b2; c2; c3; d1; d3
<b>Number of Weeks /and Units Per Semester</b>			<b>14</b>	<b>24</b>	

#### VI. Teaching strategies of the course:

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

<b>V. Assignments:</b>				
No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Participation	5	Weekly	a1; a2; a3; b1
2	Quizzes	5	Weekly	a1; a2; a3; b1
3	Research	5	6 <sup>th</sup> W	a2; a3; b2; b3; d1; d3
4	Assignments	5	6 <sup>th</sup> W	a2; a3; b2; b3; c2; c3; d1; d3
	Mid – Exam (theoretical)	20	7 <sup>th</sup> W	a1; a2; a3; b1
	<b>Total score</b>	<b>40%</b>		

<b>V. Schedule of Assessment Tasks for Students During the Semester:</b>					
No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments & Homework, Tasks & Presentation	Fortnightly	10	10%	a2; a3; b2; b3; c2; c3; d1; d3

2	Quizzes	W6	5	5%	a1; a2; a3; b1
3	Mid-Term exam	W8	20	20%	a1; a2; a3; b1
4	Practical reports	W12	5	5%	a1; a2; a3; b1; c2
6	Final Exam theory	W16	60	60%	a1; a2; a3; b1
<b>Total</b>			<b>100</b>	<b>100%</b>	

<b>VI. Learning Resources:</b>	
<b>1- Required Textbook(s) ( maximum two ).</b>	
	<ol style="list-style-type: none"> <li>Mary Anne Koda-Kimble, Lloyd Yee Young, Wayne A Kradjan, B. Joseph Guglielmo, Brian K Alldredge. Applied Therapeutics: The Clinical Use of Drugs. 9th edition. Lippincott Williams &amp; Wilkins, 2004.</li> <li>Applied therapeutics: the clinical use of drugs. Tenth edition. Wolters KluwerLippincott Williams &amp;Wilkins, USA, 2013</li> </ol>
<b>2- Essential References.</b>	
	<ol style="list-style-type: none"> <li>Introductin to Hospital and Health-System Pharmacy Practie by David A. Holdford and Thomas R. Brown</li> <li>Communicatin Skills in Pharmacy Practie : A Practial Guide for Students and Practiiners, by Robert S. Beardsley, Carole Kimberlin and William N. Tindall</li> </ol>
<b>3- Electronic Materials and Web Sites etc.</b>	
	<a href="http://online.lexi.com/lco/action/login">http://online.lexi.com/lco/action/login</a>



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



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

## **Faculty of Medical sciences**

Department of Pharmacy

Program of B. Pharmacy

## **Course Specification of**

## **Drug Delivery Systems**

**Course Code. (PH1124276)**

**2024**



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

## I. General Information:

1.	Course Title:	Drug Delivery Systems				
2.	Course Code:	PH1124276				
3.	Course Type:	Compulsory course				
4.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours	
			Lecture	Tutorial/ Seminar	Lab	Clinical
		2	2			--
5.	Level/ Semester at which this Course is offered:	Fourth Level / Second Semester				
6.	Pre –Requisite (if any):	Pharmaceutics III				
7.	Co –Requisite (if any):	Pharmacokinetics				
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 Science, Thamar University				
11.	Prepared by:	Dr. Abdulkarim K. Alzomor				
12.	Reviewed By:					
13.	Date and Number of Approval by Council:					



## II. Course Description:

This course will familiarize students with the basic fundamentals of novel drug delivery including the advantages, shortcomings, factors affecting the design of successful drug delivery. And overview of the main topics of drug delivery systems including; oral, pulmonary, trans-dermal, ocular, parenteral, nasal, implantable, and vaginal will be covered.

## III. Course Intended Learning Outcomes (CILOs) :

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

Referenced PILOs

A. Knowledge and Understanding:		I, P or M/A	Referenced PILOs
a1	Explain the pharmaceutical principles for designing targeted novel drug delivery systems	A	A2 Sufficiently knows of the analytical & biotechnical techniques, necessary for isolation, refinement, analysis & titration & manufacturing of pharmaceutical substances & preparations.
a2	Describe techniques and approaches applied in novel drug delivery systems	A	A3 Clearly distinguishes the foundations of the design of medicines & their development, using the various equipments and techniques, as well as, the tests that use in the pharmaceutical industry.
B. Intellectual Skills:			
b1	Suggest possible approaches to overcome formulation drug delivery problems.	A	B4 properly Innovates of pharmaceutical products & evaluates them on the scientific bases.
C. Professional and Practical Skills:			
c1	Prepare new formula as novel drug delivery system.	A	C1 Correctly use, the terminologies & abbreviations and the proper pharmaceutical symbols in pharmaceutical practices.

Course Specification of: Drug Delivery Systems Code. (PH1124276)

c2	Utilize pharmacopeial methods to evaluate the quantity of novel drug delivery system.	A	C4	Efficiently operates, the different technologies and equipment in the area of pharmacy.
<b>D. Transferable Skills:</b>				
d1	Perform tasks and costs of the course independently and be able to work as an effective member in a team	A	D1	Works effectively in a unique team.
d2	Employ the technologies services to solve problems of pharmaceutical calculation and develop skills.	A	D2	Correctly uses, the means of the technology, information, programs of computer and the statistical programs, which contribute in raising the health level.
<b>I= Introduced, P=Practiced or M/A= Mastered/Advanced</b>				

<b>IV. Alignment of Course Intended Learning Outcomes</b>			
<b>(A) Alignment of Course Intended Learning Outcomes (Knowledge and Understanding) to Teaching Strategies and Assessment Methods:</b>			
	<b>Course Intended Learning Outcomes</b>	<b>Teaching Strategies</b>	<b>Assessment Strategies</b>
a1	Explain the pharmaceutical principles for designing targeted novel drug delivery systems	- Lectures and Groups discussion. - Self – learning	▪ Quizzes, Presentation and Written exam.
a2	Describe techniques and approaches applied in novel drug delivery systems		
<b>(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching Strategies and Assessment Methods:</b>			
	<b>Course Intended Learning Outcomes</b>	<b>Teaching Strategies</b>	<b>Assessment Strategies</b>
b1	Suggest possible approaches to overcome formulation drug delivery problems.	- Dialogue and discussion - solving Problem	- Quizzes, Homework
<b>(C) Alignment of Course Intended Learning Outcomes (Professional and Practical Skills) to Teaching Strategies and Assessment Methods:</b>			

Course Intended Learning Outcomes		Teaching Strategies	Assessment Strategies
c1	Prepare new formula as novel drug delivery system.	<ul style="list-style-type: none"> <li>- Lectures</li> <li>- Simulation &amp; presentations</li> </ul>	<ul style="list-style-type: none"> <li>▪ Performance, Report</li> </ul>
c2	Utilize pharmacoepial methods to evaluate the quantity of novel drug delivery system.		
<b>(D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods:</b>			
Course Intended Learning Outcomes		Teaching Strategies	Assessment Strategies
d1	Perform tasks and costs of the course independently and be able to work as an effective member in a team	<ul style="list-style-type: none"> <li>- Self – learning</li> <li>- Cooperative learning</li> </ul>	<ul style="list-style-type: none"> <li>- Homework's evaluation.</li> <li>▪ Evaluation of Research reports</li> </ul>
d2	Employ the technologies services to solve problems of pharmaceutical calculation and develop skills.		

## V. Course Contents:

### A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Introduction to Novel drug delivery systems	<ul style="list-style-type: none"> <li>The need for Novel and novel drug delivery systems</li> <li>Factors related to patients' convenience</li> <li>New diseases: new challenges</li> <li>Diseases resistant to classical systems</li> <li>Other factors</li> <li>Comparison between Novel and classical delivery systems</li> </ul>	1	2	a1, a2, b1, d2
2	Extended-release systems	<ul style="list-style-type: none"> <li>Definition and purposes</li> <li>Concepts of extended-release, sustained-release</li> <li>Advantages and limitations,</li> <li>Biological features affecting extended-delivery system.</li> <li>Matrix based on hydrophilic polymers.</li> <li>Diffusion-controlling membranes.</li> <li>Osmotic pumps.</li> <li>Diffusion controlled vesicle (DCV)</li> <li>Technology of Microencapsulation</li> <li>multiple units coating (pellets)</li> <li>floating tablets</li> <li>bilayer and multiple layer- tablets</li> </ul>	4	8	a1, a2 b1, c1, c2, d2
3	Transdermal delivery systems	<ul style="list-style-type: none"> <li>Biological features affecting transdermal delivery system.</li> <li>Principle, components, formulation, advantages, disadvantages types and applications of: <ul style="list-style-type: none"> <li>Patches</li> </ul> </li> </ul>	3	6	a1, a2 b1, c1, c2, d2

#### Course Specification of: Drug Delivery Systems Code. (PH1124276)

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
		<ul style="list-style-type: none"> <li>○ Phonophoresis</li> <li>○ Iontophoresis</li> <li>○ Electroporation</li> <li>○ Needle array and needleless injection systems</li> <li>● Percutaneous enhancers</li> </ul>			
4	Mid exam		1	2	a1, a2 b1, c1.
5	Novel Parenteral systems	Principle, components, formulation, advantages, disadvantages types and applications of: <ul style="list-style-type: none"> <li>● Implants</li> <li>● Ocusert</li> </ul>	1	2	a1, a2 b1, c1, c2, d2
6	Novel Inhalation delivery systems	<ul style="list-style-type: none"> <li>● Biological features affecting inhalation delivery system.</li> <li>● Principle, components, formulation, advantages, disadvantages types and applications of:               <ul style="list-style-type: none"> <li>- Dry solid inhaler systems</li> </ul> </li> </ul>	1	2	a1, a2 b1, c1, c2, d2
7	Novel Intravaginal delivery systems	<ul style="list-style-type: none"> <li>● Biological features affecting newer intravaginal delivery system.</li> <li>● Principle, components, formulation, advantages, disadvantages and types of intravaginal systems</li> </ul>	1	2	a1, a2 b1, c1, c2, d1, d2
8	Targeted delivery systems	<ul style="list-style-type: none"> <li>● Definition</li> <li>● Purposes</li> <li>● Biological features affecting targeted delivery system.</li> <li>● Principle, components, formulation, advantages, disadvantages types and applications of:               <ul style="list-style-type: none"> <li>- cellular Types of targeted delivery systems</li> <li>- T-lymphocytes</li> <li>- Lysosome</li> <li>- Particle Types of targeted</li> </ul> </li> </ul>	3	6	a1, a2 b1, c1, c2, d1, d2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
		delivery systems - Liposomes - Monoclonal antibodies - Plasma proteins - Polymeric micelles  ❖ Prodrug Types of targeted delivery systems - Conjugation with peptides - Gene (or antibodies)-directed enzyme system - Drug-linkage-ligand system			
9		<b>Final exam</b>	1	2	a1, a2, b1, c1, c2, d1, d2
<b>Number of Weeks /and Units Per Semester</b>			<b>16</b>	<b>32</b>	

## VI. Assignments:

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	Assignment 1: Attendance	1-14	10	a1, a2, b1, c1, c2, d1, d2
2	Assignment 2: Homework, Report	6&12	5	a1, a2, b1, c1, c2, d1, d2
<b>Total</b>				

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments	1-14	15	15%	a1, a2, b1, c1, c2, d1, d2

Course Specification of: Drug Delivery Systems Code. (PH1124276)

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
2	Quizzes 1 & 2	6 & 12	5	5%	a1, a2, b1, c1, c2, d1, d2
3	Mid-Term Theoretical Exam	8	30	30%	a1, a2, b1, c1, c2, d1, d2
4	Final Theoretical Exam	16	50	50%	a1, a2, b1, c1, c2, d1, d2
<b>Total</b>			<b>100</b>	<b>100%</b>	

#### VIII. Learning Resources:

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

##### 1- Required Textbook(s) (maximum two ):

1. Howard C. Ansel, Nicholas G. Bopovich and Loyd V (1995). Allen Pharmaceutical dosage forms and drug delivery systems, 6th edition, WilliamsWilkins, Philadelphia, USA
2. J.R. Robinson and V.H.L. Lee (2002). Control drug delivery, fundamentals and applications Fourth edition Marcel Dekker Inc New York, USA.

##### 2- Recommended Books and Reference Materials.

1. Remington (2005). The Science and Practice of Pharmacy, 2first Edition, Williams and Wilkins. Maryland, USA.

##### Websites:

IX. Course Policies: (Based on the Uniform Students' By law (2007))	
1	<p><b>Class Attendance:</b></p> <p>Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.</p>
2	<p><b>Tardiness:</b></p> <p>A student will be considered late if he/she is not in class after 10 minutes of the start time of class.</p>
3	<p><b>Exam Attendance/Punctuality:</b></p> <p>No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.</p>
4	<p><b>Assignments &amp; Projects:</b></p> <p>Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.</p>
5	<p><b>Cheating:</b></p> <p>Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.</p>
6	<p><b>Forgery and Impersonation:</b></p> <p>Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.</p>
7	<p><b>Other policies:</b></p> <p>The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.</p>



## Faculty of Medical Science

Department of Pharmacy

Program of B. Pharmacy

# Course Plan of Drug Delivery Systems Course Code. PH1124276

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

**2024**

## II. General Information:

1	<b>Course Title:</b>	Drug Delivery Systems				
2	<b>Course Code:</b>	PH1124276				
3	<b>Course Type:</b>	Compulsory course				
4	<b>Credit Hours:</b>	<b>Credit Hours</b>	<b>Theory Contact Hours</b>		<b>Practical Contact Hours</b>	
			<b>Lecture</b>	<b>Tutorial/ Seminar</b>	<b>Lab</b>	<b>Clinical</b>
		2	2			--
5	<b>Level/ Semester at which this Course is offered:</b>	Fourth Level / Second Semester				
6	<b>Pre –Requisite (if any):</b>	Pharmaceutics III				
7	<b>Co –Requisite (if any):</b>	Pharmacokinetics				
8	<b>Program (s) in which the Course is Offered:</b>	Bachelor of pharmacy				
9	<b>Language of Teaching the Course:</b>	English / Arabic				
10	<b>Location of Teaching the Course:</b>	Faculty of Medical Science				
11	<b>Prepared by:</b>	Dr. Abdulkarim K. Alzomor				
12	<b>Reviewed By:</b>					
13	<b>Date and Number of Approval by Council:</b>					

### III. Course Description:

This course will familiarize students with the basic fundamentals of drug delivery including the advantages, shortcomings, factors affecting the design of successful drug delivery. And overview of the main types of drug delivery systems including; oral, pulmonary, trans-dermal, ocular, parenteral, nasal, implantable, and vaginal will be covered.

### IV. Course Intended Learning Outcomes (CILOs) :

Upon successful completion of the Course, student will be able to:

#### A. Knowledge and Understanding:

- |    |                                                                                          |
|----|------------------------------------------------------------------------------------------|
| a1 | Explain the pharmaceutical principles for designing targeted novel drug delivery systems |
| a2 | Describe techniques and approaches applied in novel drug delivery systems                |

#### B. Intellectual Skills:

- |    |                                                                             |
|----|-----------------------------------------------------------------------------|
| b1 | Suggest possible approaches to overcome formulation drug delivery problems. |
|----|-----------------------------------------------------------------------------|

#### C. Professional and Practical Skills:

- |    |                                                                                       |
|----|---------------------------------------------------------------------------------------|
| c1 | Prepare new formula as novel drug delivery system.                                    |
| c2 | Utilize pharmacopeial methods to evaluate the quantity of novel drug delivery system. |

#### D. Transferable Skills:

- |    |                                                                                                          |
|----|----------------------------------------------------------------------------------------------------------|
| d1 | Perform tasks and costs of the course independently and be able to work as an effective member in a team |
| d2 | Employ the technologies services to solve problems of pharmaceutical calculation and develop skills.     |

## V. Course Contents:

### A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1	Introduction to Novel drug delivery systems	<ul style="list-style-type: none"> <li>The need for Novel and novel drug delivery systems</li> <li>Factors related to patients' convenience</li> <li>New diseases: new challenges</li> <li>Diseases resistant to classical systems</li> <li>Other factors</li> <li>Comparison between Novel and classical delivery systems</li> </ul>	1	2
2	Extended-release systems	<p>Definition and purposes</p> <ul style="list-style-type: none"> <li>Concepts of extended-release, sustained-release</li> <li>Advantages and limitations,</li> <li>Biological features affecting extended-delivery system.</li> <li>Matrix based on hydrophilic polymers.</li> <li>Diffusion-controlling membranes.</li> <li>Osmotic pumps.</li> <li>Diffusion controlled vesicle (DCV)</li> <li>Technology of Microencapsulation</li> <li>multiple units coating (pellets)</li> <li>floating tablets</li> <li>bilayer and multiple layer- tablets</li> </ul>	4	8
3	Transdermal delivery systems	<p>Biological features affecting transdermal delivery system.</p> <ul style="list-style-type: none"> <li>Principle, components, formulation, advantages, disadvantages types and applications of: <ul style="list-style-type: none"> <li>Patches</li> <li>Phonophoresis</li> <li>Iontophoresis</li> <li>Electroporation</li> <li>Needle array and needleless injection systems</li> </ul> </li> <li>Percutaneous enhancers</li> </ul>	3	6
4	Mid exam		1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
5	<ul style="list-style-type: none"> <li>Novel Parenteral systems</li> </ul>	Principle, components, formulation, advantages, disadvantages types and applications of: <ul style="list-style-type: none"> <li>Implants</li> <li>Ocusert</li> </ul>	1	2
6	Novel Inhalation delivery systems	Biological features affecting inhalation delivery system. <ul style="list-style-type: none"> <li>Principle, components, formulation, advantages, disadvantages types and applications of:               <ul style="list-style-type: none"> <li>Dry solid inhaler systems</li> </ul> </li> </ul>	1	2
7	Novel Intravaginal delivery systems	<ul style="list-style-type: none"> <li>Biological features affecting newer intravaginal delivery system.</li> <li>Principle, components, formulation, advantages, disadvantages and types of intravaginal systems</li> </ul>	1	2
8	Targeted delivery systems	<b>Definition</b> <ul style="list-style-type: none"> <li>Purposes</li> <li>Biological features affecting targeted delivery system.</li> <li>Principle, components, formulation, advantages, disadvantages types and applications of:               <ul style="list-style-type: none"> <li>cellular Types of targeted delivery systems</li> <li>T-lymphocytes</li> <li>Lysosome</li> <li>Particle Types of targeted delivery systems</li> <li>Liposomes</li> <li>Monoclonal antibodies</li> <li>Plasma proteins</li> <li>Polymeric micelles</li> </ul> </li> <li>❖ Prodrug Types of targeted delivery systems               <ul style="list-style-type: none"> <li>Conjugation with peptides</li> <li>Gene (or antibodies)-directed enzyme system</li> <li>Drug-linkage-ligand system</li> </ul> </li> </ul>	3	6
9	Final exam		1	2

Course Specification of: Drug Delivery Systems Code. (PH1124276)

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
Number of Weeks /and Units Per Semester			16	32

## VI. : Teaching Strategies of the Course:

<b>(A) (Knowledge and Understanding)</b>
<ul style="list-style-type: none"> <li>▪ Lectures and Groups discussion.</li> <li>▪ Self – learning</li> </ul>
<b>(B) (Intellectual Skills)</b>
<ul style="list-style-type: none"> <li>▪ Dialogue and discussion</li> <li>▪ solving Problem</li> </ul>
<b>(C) (Professional and Practical Skills)</b>
<ul style="list-style-type: none"> <li>▪ Lectures</li> <li>▪ Simulation &amp; presentations</li> </ul>
<b>(D) (Transferable Skills)</b>
<ul style="list-style-type: none"> <li>▪ Self – learning</li> <li>▪ Cooperative learning</li> </ul>

## VII. Assessment Methods of the Course:

<b>(A) (Knowledge and Understanding)</b>
<ul style="list-style-type: none"> <li>▪ Quizzes, Presentation and Written exam.</li> </ul>
<b>(B) (Intellectual Skills)</b>
<ul style="list-style-type: none"> <li>▪ Quizzes, Homework</li> </ul>
<b>(C) (Professional and Practical Skills)</b>
<ul style="list-style-type: none"> <li>▪ Performance, Report</li> </ul>
<b>(D) (Transferable Skills)</b>
<ul style="list-style-type: none"> <li>▪ Homework's evaluation.</li> <li>▪ Evaluation of Research reports</li> </ul>

**Course Specification of: Drug Delivery Systems Code. (PH1124276)**

### VIII. Assignments:

No.	Assignments	Week Due	Mark
1	Assignment 1: Attendance	1-14	10
2	Assignment 2: Homework, Report	6&12	5
<b>Total</b>			

### IX. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments	1-14	15	15%
2	Quizzes 1 & 2	6 & 12	5	5%
3	Mid-Term Theoretical Exam	8	30	30%
4	Final Theoretical Exam	16	50	50%
<b>Total</b>			<b>100</b>	<b>100%</b>

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Websites:

## XI. Course Policies: (Based on the Uniform Students' Bylaw (2007))

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