

Academic Program Description Form

University Name: Al-Ayen Iraqi University

Faculty/Institute: Pharmacy

Scientific Department: College of Pharmacy

Academic or Professional Program Name: Bachelor of Pharmacy

Final Certificate Name: Bachelor of Pharmaceutical Sciences

Academic System: Semester

Description Preparation Date: 2025/2026

File Completion Date: 10/2025

Signature:



Head of Department

Name:

Date: 10/2025

Signature:



Scientific Associate Name:

Date:

معاون العميد للشؤون العلمية
د. صفاء هادي محمد

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date: 10/2025

Signature:



Approval of the Dean



1. Program Vision

Leadership and excellence in preparing qualified pharmacists with essential knowledge, skills, advanced training, professional competence, and ethical practice to improve patient care and enhance community services locally and globally.

2. Program Mission

Preparing highly skilled and competitive pharmacists through high-quality pharmaceutical education, an academic environment, and training that promotes professionalism, teamwork, innovation, and research excellence, to contribute to sustainable societal development and keep pace with the needs of the labor market.

3. Program Objectives

1. Preparing qualified pharmacists to work in the pharmaceutical and healthcare fields locally and globally.
2. Equip students with essential knowledge, a commitment to lifelong learning, professional competence, teamwork skills, and ethical values.
3. Developing high-quality educational standards and academic environment.
4. Effective community engagement to improve patient care and enhance public health awareness.
5. Continuously update curricula and training programs to align with the healthcare sector and labor market needs.
6. Promote applied research addressing the community healthcare challenges.
7. Build collaborations with local and global institutions to support the college's goals and advanced pharmaceutical education and practice.

4. Program Accreditation

National accreditation/National Council for Accreditation of Pharmacy Colleges is in progress

5. Other external influences

Practice sites– Office research – extracurricular activities – volunteer activities – other

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	8	10	5.5	Basic
College Requirements	55	169	94.4	Basic
Department Requirements	/	/	/	/
Summer Training		Satisfied		
Other	/	/	/	/

* This can include notes whether the course is basic or optional.

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			Theoretical	Practical
Year 1, 1st semester	PH1103	Analytical chemistry	3	2
	PH1104	Medical terminology	1	–
	PH1105	Biostatistics	2	–
	PH1101	Human anatomy and histology	3	2

	PH1106	Human Rights and Democracy	2	–
	PH1102	Medical physics	1	2
Year 1, 2nd semester	PH1202	Pharmaceutical calculation	3	2
	PH1203	Arabic language	2	–
	PH1204	Organic Chemistry I	3	2
	PH1201	Physiology 1	3	2
	PH1205	Computer sciences	1	2
Year 2, 1st semester	PH2103	Physical pharmacy 1	3	2
	PH2101	Organic chemistry II	3	2
	PH2102	Medical Microbiology I	3	2
	PH2104	Physiology I	3	2
	PH2106	Computer sciences	1	2
	PH2105	Crimes of Baath system	2	–
	PH2107	Arabic Language	2	–
Year 2, 2nd semester	PH2203	Physical pharmacy 2	3	2
	PH2201	Organic chemistry III	2	2
	PH2202	Medical Microbiology II	3	2
	PH2205	Pharmacognosy I	3	2
	PH2206	Arabic language	2	–
	PH2204	Physiology II	3	2
Year 3, 1st semester	PH3103	Pharmaceutical technology	3	2
	PH3105	Pathophysiology	3	2

	PH3101	inorganic pharmaceutical chemistry I	2	2
	PH3102	pharmacognosy II	2	2
	PH3104	Biochemistry I	3	2
Year 3, 2nd semester	PH3203	Pharmaceutical and cosmetic preparations	3	2
	PH3201	Organic Pharmaceutical Chemistry I	3	2
	PH3202	Pharmacology I	3	–
	PH3204	biochemistry II	3	2
	PH3205	Pharmacognosy III	2	2
	PH3203	Pharmacy ethics	1	–
Year 4, 1st semester	PH4104	Biopharmaceutics	2	2
	PH4101	Pharmacology II	3	2
	PH4102	Organic Pharmaceutical Chemistry II	3	2
	PH4206	Clinical Pharmacy I	2	2
	PH4105	Public health	2	–
Year 4, 2nd semester	PH4205	Industrial pharmacy 1	3	2
	PH4201	pharmacology III	2	–
	PH4202	Organic Pharmaceutical Chemistry III	3	2
	PH4103	Clinical pharmacy II	2	2
	PH4204	General toxicology	2	2

	PH4206	Communication skills	2	–
Year 5, 1st semester	PH5102	Industrial pharmacy 2	3	2
	PH5107	Graduation Project	1	–
	PH5103	Applied therapeutics I	3	–
	PH5104	Clinical chemistry	3	2
	PH5105	Training of clinical laboratories	–	4
	PH5106	Clinical toxicology	2	2
	PH5101	Organic Pharmaceutical Chemistry IV	2	–
Year 5, 2nd semester	PH5206	Drug delivery systems	2	–
	PH5204	Advanced pharmaceutical analysis	3	2
	PH5205	Hospital training	–	4
	PH5206	Therapeutic drug monitoring (TDM)	2	2
	PH5201	Pharmacoeconomics	2	–
	PH5202	Applied therapeutics II	2	–
	PH5207	Pharmaceutical biotechnology	1	–

8. Expected learning outcomes of the program

A) Knowledge

1. Recognize the normal functions of the body and changes in these functions associated with disease conditions	To understand the human body, its organs, and their functions in both health and disease, from anatomical, functional, biochemical, and clinical perspectives
2. Identify the drug as a chemical compound and identify its chemical and physical properties	To evaluate how a drug's properties influence its efficacy and potential side effects
3. Identify the types of pharmaceutical dosage forms	To determine the appropriate dosage form and preparation methods, and to evaluate them in terms of effectiveness, therapeutic outcomes, side effects, stability, and accurate dose calculation
4. Identify the different treatment options	To select the appropriate treatment for a pathological condition and achieve the desired therapeutic outcome
5. Understand the concepts of human rights and citizenship	The pharmacist is conscious of his/her responsibilities and rights as a responsible member of society
6. Learn about the principles of medical statistics and medical physics	Understanding the fundamentals of evaluating the outcomes of clinical and economic studies of pharmaceuticals
7. Identify the mechanism of action of drugs, its side effects and their toxicity	Recognition and analysis of drug interactions

B) Skills

1. Working in laboratory environment	The student is capable of safely handling laboratory equipment and reagents while adhering to laboratory safety standards
2. Self-learning	The student is able to locate relevant information and apply it effectively
3. Providing the highest level of health care	The pharmacist is able to provide scientific and pharmaceutical consultations to individuals in healthcare settings and the community, as well as conduct treatment follow-up
4. Provide safe and effective treatment	The pharmacist is able to identify medication errors by evaluating the appropriateness of treatment for the patient's condition, checking for potential drug interactions, and considering the patient's overall health status
5. Communication with patients	The pharmacist is able to effectively communicate with patients from diverse educational backgrounds, social statuses, and health conditions
6. Communication with medical team members	The pharmacist can effectively communicate with medical staff, including physicians and nurses, to identify and correct medication errors and provide scientifically-based treatment recommendations
7. Follow-up on the safety and effectiveness of the treatment provided to the patient	The pharmacist is able to apply fundamental principles of drug chemistry and pharmacology to interpret drug interactions and provide pharmaceutical guidance to both medical staff and the community
8. Handling and dispensing of medications	The pharmacist is capable of educating patients on the proper use of various dosage forms, as well as their correct storage and disposal

9. Preparation of pharmaceutical products and extemporaneous compounding	The pharmacist is able to prepare compounded dosage forms in the pharmacy as required and to work in the pharmaceutical industry
C) Ethics	
1. Dealing with patients with the ethics of the pharmacy profession	The pharmacist upholds patient confidentiality and prioritizes the safety and well-being of both patients and the community as a fundamental responsibility of the pharmacy profession
2. Teamwork with other colleagues within the health care team in the work environment	The pharmacy student and pharmacist interact with classmates and colleagues in a collaborative, team-oriented manner

9. Teaching and Learning Strategies
• lectures included multimedia lectures • Power Point presentation • Practical work • Open discussion • Class activity • Self-learning • Brainstorming • Problem solving • Flipped learning class • Hybrid education • Role play • Research project • Cases based studies

10. Evaluation methods

- Homework and reports
- Daily and weekly exams
- Assessment of practical skills
- Mid-term and final exams
- Graduation projects

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	0	2			2	0
Assistant Professor	19	10			11	18
Teacher	6	11			12	5
Assistant teacher	28	13			25	16

Professional Development

Mentoring new faculty members

- Teaching methods course
- Teaching validity course

Professional development of faculty members

Workshops, seminars and courses in:

- The methods and strategies of pharmaceutical education
- The basis for assessments and exam design

- Interactive education strategies
- Foundations and methods for updating and developing the curriculum

12. Acceptance Criterion

High school GPA and physical health as approved by the Ministry of higher Education and Scientific Research

13. The most important sources of information about the program

- a) The College of Pharmacy, University of Al-Ayen website, in Arabic and English
- b) University of Al-Ayen website
- c) Website of the Ministry of higher Education and Scientific Research
- d) University of Al-Ayen College of Pharmacy page on social networking sites

14. Program Development Plan

- Increase the use of technology in the lecture room
- Promote scientific research and induction
- Foster scientific skill development
- Implementation objective structured clinical exam (OSCE) for all clinical pharmacy courses and related course
- Incorporate Active Learning Strategies
- Expand the use of technology in education
- Foster Research and Inquiry
- Develop Practical Skills
- Encourage Interdisciplinary Collaboration
- Professional Development for Faculty

Program Skills Outline																				
			Required program Learning outcomes																	
Year/ Level	Course Code	Course Name	Knowledge							Skills									Ethics	
			A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2
Year 1, First semester	PH1101	Human anatomy and histology	/							/	/				/					/
	PH1102	Medical physics						/		/	/				/					/
	PH1103	Analytical chemistry		/						/								/		/
	PH1104	Medical terminology							/		/			/	/					/
	PH1105	Biostatistics						/			/				/					/
	PH1106	Human Rights & Democracy					/							/	/				/	/

Program Skills Outline																				
			Required program Learning outcomes																	
Year/ Level	Course Code	Course Name	Knowledge							Skills									Ethics	
			A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2
Year 1, second semester	PH1201	Physiology 1	/						/		/						/		/	/
	PH1202	Pharmaceutical calculations			/	/				/	/							/		/
	PH1203	Arabic language												/	/				/	/
	PHH1204	Organic Chemistry I		/							/							/		/
	PH1205	Computers								/	/				/					/

Program Skills Outline																				
			Required program Learning outcomes																	
Year/ Level	Course Code	Course Name	Knowledge							Skills									Ethics	
			A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2
year 2, first semester	PH2101	organic chemistry II		/						/								/		/
	PH2102	medical microbiology I								/	/	/			/					/
	PH2103	physical pharmacy I		/	/					/	/							/		/
	PH2106	Computer sciences								/	/				/					/
	PH2104	Physiology I	/						/		/						/		/	/
	PH2107	Arabic Language												/	/				/	/
	PH2105	Baath Regime Crimes in Iraq					/													

Program Skills Outline																				
Required program Learning outcomes																				
Year/ Level	Course Code	Course Name	Knowledge							Skills									Ethics	
			A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2
year 2 , second semester	PH2201	Organic Chemistry III		/						/	/							/		/
	PH2202	medical microbiology II								/	/	/			/					/
	PH2203	physical pharmacy II		/	/					/	/							/		/
	PH2204	physiology II	/						/		/						/		/	/
	PH2205	pharmacognosy I		/					/	/	/	/	/						/	
	PH2206	Arabic Language												/	/				/	/

Program Skills Outline																				
Required program Learning outcomes																				
Year/ Level	Course Code	Course Name	Knowledge							Skills									Ethics	
			A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2
year3 , First semester	PH3101	inorganic pharmaceutical chemistry I		/					/	/	/							/		/
	PH3102	pharmacognosy II	/						/	/	/	/	/						/	
	PH3103	pharmaceutical technology			/					/	/	/					/	/	/	/
	PH3104	Biochemistry I	/							/	/	/			/					/
	PH3105	pathophysiology	/							/	/				/					/

Program Skills Outline																				
Required program Learning outcomes																				
Year/ Level	Course Code	Course Name	Knowledge							Skills									Ethics	
			A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2
year 3, Second semester	PH3201	organic pharmaceutical chemistry I		/					/	/	/							/		/
	PH3202	Pharmacology I			/	/								/	/	/	/		/	/
	PH3203	Pharmaceutical and cosmetic preparations			/					/	/	/					/	/	/	/
	PH3204	biochemistry II	/							/	/	/			/					/
	PH3205	pharmacognosy III		/					/	/	/	/	/						/	
	PH3203	pharmacy ethics					/							/	/				/	/

Program Skills Outline																				
			Required program Learning outcomes																	
Year/ Level	Course Code	Course Name	Knowledge							Skills									Ethics	
			A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2
year 4, First semester	PH4101	Pharmacology II		/	/			/		/			/	/	/	/			/	/
	PH4102	Organic pharmaceutical chemistry II		/					/	/	/							/		/
	PH4206	Clinical pharmacy I	/			/			/			/	/	/		/	/		/	/
	PH4104	Biopharmaceutics	/		/				/	/	/		/			/				/
	PH4105	Public health	/			/		/				/							/	/

Program Skills Outline																				
			Required program Learning outcomes																	
Year/ Level	Course Code	Course Name	Knowledge							Skills									Ethics	
			A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2
/Year 4, Second semester	PH4201	pharmacology III									/				/					/
	PH4202	organic pharmaceutical chemistry III		/	/		/		/					/	/	/	/		/	/
	PH4103	clinical pharmacy II		/				/	/	/								/		/
	PH4204	general toxicology	/			/			/		/	/	/	/	/	/	/		/	/
	PH4205	industrial pharmacy I		/		/				/	/		/	/	/	/			/	/
	PH4206	communication skills		/	/			/		/	/							/		/

Program Skills Outline																					
			Required program Learning outcomes																		
Year/ Level	Course Code	Course Name	Knowledge							Skills									Ethics		
			A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2	
Year 5, First semester	PH5101	organic pharmaceutical chemistry IV		/					/		/										
	PH5102	industrial pharmacy II		/	/			/	/	/								/		/	
	PH5103	applied therapeutics I	/			/			/		/	/			/	/		/	/		
	PH5104	clinical chemistry	/							/	/	/		/	/			/	/		
	PH5105	clinical laboratory training	/							/	/	/		/	/			/	/		
	PH5106	clinical toxicology	/			/			/		/	/	/	/	/	/	/	/	/		
	PH5107	graduation projects	/								/										

Program Skills Outline																				
			Required program Learning outcomes																	
Year/ Level	Course Code	Course Name	Knowledge							Skills									Ethics	
			A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2
Year 5, Second semester	PH5201	pharmacoeconomic						/			/	/								/
	PH5202	applied therapeutics II	/			/			/			/	/			/	/		/	/
	PH5206	therapeutic drug monitoring			/	/			/			/	/		/	/			/	/
	PH5204	advanced pharmaceutical analysis		/	/					/	/									/
	PH5205	hospital training	/			/			/			/	/	/	/	/	/		/	/
	PH5206	Drug delivery systems		/					/		/									
	PH5207	pharmaceutical biotechnology		/	/			/	/	/								/		/

Please tick the boxes corresponding to the individual program learning outcomes under evaluation

Course Description Form

1. Course Name:					
Medical terminology					
2. Course Code:					
PH1104					
3. Semester / Year:					
First semester/ first level					
4. Description Preparation Date:					
1/1/2026					
5. Available Attendance Forms:					
Full-time and official attendance hours					
6. Number of Credit Hours (Total) / Number of Units (Total)					
15h / 1 unit					
7. Course administrator's name (mention all, if more than one name)					
Name: MSC.Ramiz Talib					
Email: Ramiz.talb@alayen.edu.iq					
8. Course Objectives					
Course Objectives		1. Scientific preparation of the student with regard to medical and scientific terminology related to his studies for the purpose of preparing a student capable of dealing with all medical terminology used in his studies. 2. In this course, students will learn the pronunciation, spelling, and definition of medical and pharmaceutical terms used in health care. They will use a word-building strategy that helps them discover connections. Relationships between word roots, prefixes and suffixes. 3. They will learn the meaning of each part of a complex medical and pharmaceutical term. Ability to put parts together and define a term.			
9. Teaching and Learning Strategies					
Strategy		1- Whiteboard, multimedia lectures, power point presentation 2- Class discussion 3- Handouts 4- Brainstorming			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1.	1	Define common medical word roots and suffixes and correctly use them to interpret basic medical terms.	Basic word roots and common suffixes	1- Whiteboard, multimedia lectures,	1- Short MCQs 2- Oral exam and direct

2-3	2	Identify and apply advanced pharmaceutical prefixes, roots, and suffixes to understand terminology used in pharmacy-related disciplines.	More word roots, suffixes and prefixes related to pharmaceutical sciences (pharmacognosy, clinical pharmacy, pharmaceuticals,...etc)	power point presentation 2- Class discussion 3- Handouts 4- Brainstorming	questions in the class 3- Midterm exam 4- Electronic exams on the electronic platform 5- Final exam
4	1	Recognize standard anatomical terms and describe common abnormal conditions using correct medical terminology. Apply anatomical terminology to explain disease states and abnormalities affecting body systems.	Basic anatomical terms and abnormal conditions		
5	1	Describe the structure and function of the genital and urinary systems and interpret related medical terms.	The genitals and urinary tract		
6	1	Identify parts of the gastrointestinal tract and use medical terminology to describe digestive disorders and procedures.	The gastrointestinal tract		
7	1	Explain cardiovascular anatomy and physiology and correctly use terminology related to heart diseases and treatments.	The heart and cardiovascular system		
8-9	2	Distinguish between symptoms, diagnoses, and treatments, and interpret medical communication qualifiers and basic statistics. Accurately use clinical terminology to describe patient conditions,	Symptoms, diagnoses, treatments, communication qualifiers, and statistics		

		medical decisions, and healthcare outcomes.			
10	1	Describe stages of human growth and development and correctly use terms related to body orientation and position.	Growth and development, and body orientation		
11	1	Identify terminology related to female reproductive health, pregnancy, and childbirth processes	Gynecology, pregnancy, and childbirth		
12	1	Explain the anatomy and function of the eye and respiratory system and apply relevant medical terms to disorders and treatments.	The eye and the respiratory tract		
13	1	1. Identify basic structures and functions of the nervous system. 2. Use correct medical terminology related to neurological and behavioral disorders. 3. Recognize common neurological and behavioral conditions. 4. Interpret symptoms, diagnoses, and treatments related to nervous system disorders.	The nervous system and behavioral disorders		
14	1	• Identify the main components and	Blood and immunity		

		functions of blood and the immune system. • Use basic medical terminology related to blood and immunity. • Recognize common blood and immune disorders.			
15	1	• Understand basic concepts and terminology used in pharmaceutical sciences. • Identify key principles of pharmacognosy, pharmaceuticals, and clinical pharmacy. • Apply pharmaceutical terminology to drug development, preparation, and use	Pharmaceutical sciences		

11. Course Evaluation

20% Midterm exam, 10% (Quizzes, attendance, active participation in class, assignment), 70% final

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Medical Terminology: An Illustrated Guide, the latest edition, by Barbara Janson Cohen Introduction to Medical Terminology, 1st Edition
Main references (sources)	Medical Terminology: An Illustrated Guide, the latest edition, by Barbara Janson Cohen Introduction to Medical Terminology, 1st Edition A Short Course in Medical Terminology: Enhanced Reprint (Point (Lippincott Williams & Wilkins)

Recommended books and references (scientific journals, reports...)

Electronic References, Websites

- MedlinePlus Medical Dictionary (NIH) – <https://medlineplus.gov>
- Merriam-Webster Medical Dictionary – <https://www.merriam-webster.com/medical>
- Taber's Medical Dictionary (Online) – <https://www.tabers.com>
- Dorland's Medical Dictionary – <https://www.dorlands.com>
- Drugs.com Medical Dictionary – <https://www.drugs.com/dictionary>
- Online Etymology Dictionary (for word roots) – <https://www.etymonline.com>

Course Description Form

1. Course Name:	
Analytical chemistry	
2. Course Code:	
PH1101	
3. Semester / Year:	
First semester / first level	
4. Description Preparation Date:	
2025–2026	
5. Available Attendance Forms:	
Full–time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2x15= 45 hrs. (theoretical) 2x15=30 hrs. (practical) /number of units = 4	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Mohamed Mohamed Shahin Email: MohamedShahin.pharm@gmail.com	
8. Course Objectives	
Course Objectives	- By the end of this course, students will be able to: Understand the fundamentals of classical and instrumental analytical techniques. - Apply statistical tools in interpreting analytical data. - Recognize the role of pharmacopoeias in pharmaceutical quality control. - Perform basic titrimetric and gravimetric analyses relevant to pharmaceutical compounds
9. Teaching and Learning Strategies	
Strategy	1–lectures included multimedia lectures 2– power point presentation 3– practical work 4– open discussion

		5– class activity 6–Self learning 7– Quizzes and assignments			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2	3	1. Define analytical chemistry and its importance in pharmacy. 2. Differentiate between qualitative and quantitative analysis. 3. List common classical and instrumental analytical techniques. 4. Explain the role of analytical chemistry in drug development stages. 5. Describe how analytical chemistry supports pharmaceutical quality control.	Introduction to Analytical Chemistry: Types and roles in drug development and QC	1–lectures included multimedia lectures 2– power point presentation 3– open discussion 5– class activity 6–Self learning	1–written exam 2– Quiz 3–midterm exam 4– final exam
3–5	4	By the end of this topic, students should be able to: 1. List common units of concentration. 2. Explain the difference between primary and secondary standards. 3. Describe the steps to prepare a standard solution.	Review of Basic Concepts: Concentration units, standards, solution preparation.		

5-7	4	By the end of this topic, students should be able to: 1. Say what a pharmacopoeia is and why it is important. 2. Name examples like USP and BP. 3. Explain what a monograph is and what it includes. 4. Understand what specifications are in medicine quality control.	Introduction to Pharmacopoeias: USP, BP, monographs, specifications		
8-9	2	By the end of this case study, students should be able to: 1. Explain what a pharmacopoeial monograph is and what it includes. 2. Identify key tests and limits in a monograph. 3. Understand why method validation is important. 4. List basic ICH Q2(R1) validation parameters.	Case Study: Interpreting pharmacopoeial monographs and ICH Q2(R1) overview		
9-12	5	By the end of this topic, students should be able to: 1. Define gravimetric analysis. 2. Describe the steps: precipitation, filtration,	Gravimetric Analysis: Precipitation, weighing, error sources.		

		drying, and weighing. 3. List common sources of error in gravimetric analysis.			
13-15	5	By the end of this topic, students should be able to: 1. Define volumetric analysis and titration. 2. Explain how acid-base titrations work. 3. Identify common indicators and their color changes. 4. Understand the pH scale. 5. Use the titration formula to calculate unknown concentrations.	Volumetric Analysis I: Acid-base titrations, indicators, pH, calculations		
16,17	3	By the end of this topic, students should be able to: 1. Describe what precipitation and complexometric titrations are. 2. Explain the Mohr method for chloride determination. 3. Explain how EDTA is used to measure metal ions. 4. Identify the indicators used in both titration types.	Volumetric Analysis II: Precipitation and Complexometric titration (Mohr, EDTA)		
18,19	3	By the end of this topic,	Redox Titrations:		

		students should be able to: 1. Define redox titration and explain the basic principle. 2. Describe iodometry and its use of iodine and thiosulfate. 3. Explain how KMnO_4 acts as a titrant and indicator. 4. Recognize color changes and endpoints in redox titrations.	Principles, iodometry, permanganometry		
20-24	7	By the end of this topic, students should be able to: 1. Calculate the mean and standard deviation of a data set. 2. Explain what confidence limits mean. 3. Use the Q-test to check for outliers. 4. Understand the purpose of the Grubbs test.	Statistical Evaluation of Data: Mean, SD, confidence limits, Q-test, Grubbs test		
25,26	3	By the end of this topic, students should be able to: 1. Explain the principle of UV-Visible spectrophotometry. 2. State Beer's Law and its variables. 3. Describe how absorbance relates to	UV-Visible Spectrophotometry: Principles, Beer's Law, applications.		

		concentration. 4. List common applications in pharmacy and science.			
27,28	3	By the end of this topic, students should be able to: 1. Define potentiometry and conductometry. 2. Explain how each method works. 3. List common uses of potentiometry and conductometry in analysis. 4. Understand the role of electrodes and ions in these methods.	Electrochemical Methods: Potentiometry, Conductometry		
29,30	3	By the end of this topic, students should be able to: 1. Define chromatography and its purpose. 2. Describe how paper chromatography and TLC work. 3. Compare the two methods. 4. Calculate and interpret R _f values.	Introduction to Chromatography: TLC, paper chromatography		

11. Course Evaluation

Written exam 60 marks

Midterm 15 marks

Practical exam 10 marks

Collective Theo practical exam 5 marks

Course work 10 marks

Total =100 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Quantitative Chemical Analysis – Daniel C. Harris
Main references (sources)	1) Fundamentals of Analytical Chemistry – Skoog, West, Holler & Crouch 2) Pharmaceutical Analysis – A.H. Beckett & J.B. Stenlake
Recommended books and references (scientific journals, reports...)	British Pharmacopoeia (BP), United States Pharmacopeia (USP), ICH
Electronic References, Websites	Analytical sciences Digital library (ASDL) and Royal Society of Chemistry Databases

Course Description Form

1. Course Name:					
Biostatistics					
2. Course Code:					
PH1105					
3. Semester / Year:					
First semester/first level					
4. Description Preparation Date:					
2025-22026					
5. Available Attendance Forms:					
Full-time and official attendance hours					
6. Number of Credit Hours (Total) / Number of Units (Total)					
3x15=45 hrs/ 3units					
7. Course administrator's name (mention all, if more than one name)					
Name: Mustafa Jumaah Maarooof					
Email: Mustafa.Jumaah@alayen.edu.iq					
8. Course Objectives					
Course Objectives		Understand the terms, concepts and laws in biostatistics and their application in the field of pharmacy			
9. Teaching and Learning Strategies					
Strategy		1. Discussion of teamwork 2. Self-report writing 3. Use the strategy of cooperation and assistance during the education process 4. Holding seminars, courses and workshops for students that encourage spiritual values			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1.	3	This topic aims to teach students the basic	Fundamentals of biostatistics and descriptive statistics	Power Points.	Quizzes , homework and

		concepts of descriptive statistics. Students learn how to collect data in an accurate and organized way and understand the meaning of variables and their types, such as qualitative and quantitative variables. The topic also introduces how to organize data using frequency tables, including absolute, relative, and cumulative frequencies, which help in presenting data clearly and simply		Whit board	Oral examination
2.	3	In addition, students learn the measures of central tendency, which are used to describe the center of the data. These include the mean, median, and mode. By the end of this topic, students will be able to summarize, describe, and perform basic analysis of data, providing a foundation for	Fundamentals of biostatistics and descriptive statistics		

		more advanced statistical studies.			
3.	3	This topic aims to introduce students to the basic concepts of differentiation and integration in calculus. Students learn the meaning of derivatives and integrals and understand their mathematical definitions and notation.	Integration and differentiation		
4.	3	he topic explains how to differentiate functions and interpret the derivative as a rate of change and slope of a curve. It also introduces integration as the inverse process of differentiation, with an emphasis on basic integration rules and techniques. By the end of this topic, students will be able to differentiate and integrate basic functions, understand their applications, and use these concepts as a foundation for more advanced	Integration and differentiation		

		topics in calculus and applied mathematics.			
5.	3	This topic aims to introduce students to the applications of the area under the curve. Students learn how definite integrals are used to calculate the area between a curve and the coordinate axes or between two curves. The topic explains the use of integrals in practical and real-life applications, such as calculating distance, displacement, accumulated quantities, and physical or engineering problems.	Applications of the area under the curve		
6	3	students will be able to apply definite integrals to find area and interpret the meaning, providing a solid foundation for more advanced applications in mathematics and applied sciences.	Applications of the area under the curve		
7	3	This topic aims to introduce students to the concepts of samples and confidence	Samples and confidence intervals		

		intervals in statistics. Students learn the difference between a population and a sample, and how to select samples to represent the population accurately. The topic also explains confidence intervals as a method for estimating population parameters based on sample data, and how the level of confidence reflects the reliability of the estimate. By the end of this topic, students will be able to construct and interpret confidence intervals, understand sampling variability, and use these concepts as a foundation for more advanced statistical inference.			
8	3	This topic aims to introduce students to the basic concepts of sampling and confidence intervals.	Samples and confidence intervals		

		Students learn the difference between a population and a sample, as well as common sampling methods used to obtain representative data. The topic explains the concept of confidence intervals as a statistical tool for estimating population parameters using sample data, and shows how confidence levels indicate the degree of certainty in the estimation. By the end of this topic, students will be able to understand sampling variability, construct confidence intervals, and correctly interpret their results, forming a basis for more advanced studies in statistical inference.			
9	3	This topic aims to introduce students to the concepts of dependent and	Dependent and independent variables		

		independent variables. Students learn how to identify the independent variable as the factor that is controlled or changed, and the dependent variable as the outcome or response that is measured. The topic explains the relationship between these variables and their role in experiments, observational studies, and data analysis. By the end of this topic, students will be able to distinguish between dependent and independent variables, understand their interactions, and apply these concepts correctly in scientific and statistical studies.			
10.	3	This topic aims to introduce students to the concepts of correlation and regression. Students learn how to measure	Correlation and regression		

		the strength and direction of the relationship between two variables using correlation, and how to predict or model one variable based on another using regression analysis. The topic explains different types of correlation, the interpretation of correlation coefficients, and the basic principles of simple linear regression. By the end of this topic, students will be able to analyze relationships between variables, interpret correlation coefficients, and apply simple regression for prediction, providing a foundation for more advanced statistical modeling.			
11	3	This topic introduces correlation and regression. Students learn to measure the relationship between two	Correlation and regression		

		variables and use regression to predict one variable from another. By the end, students can interpret correlation and apply simple regression for basic predictions.			
12	3	This topic covers one-sample and two-sample tests. Students learn to compare sample data to a population (one-sample) or compare two groups (two-sample) to make statistical conclusions. By the end, students can perform basic hypothesis tests for one or two samples.	One-sample tests and Two-sample tests		
13	3	This topic introduces analysis of variance (ANOVA), which is used to compare means of three or more groups. By the end, students can determine if group differences are statistically significant.	Analysis of variance tests		

14	3	This topic covers methods for non-normal distributions, teaching students how to analyze data that do not follow a normal distribution. By the end, students can apply appropriate non-parametric tests.	Choices in the domain of non-normal distribution		
15	3	This topic covers correlation tests for categorical variables, teaching students how to assess associations between categorical data. By the end, students can determine if categories are related statistically.	Correlation test for categorical variables		

11. Course Evaluation

Written exam 70 marks

Midterm 20 marks

Class work 10 marks

Total = 100 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)

1–Calculus(Thomas)(Eleventh edition)

2–Introductory Biostatistics for the health sciences(Robert C. Duncan,...)(Second edition)

Main references (sources)	1–Calculus(Thomas)(Eleventh edition).2011 2–Introductory Biostatistics for the health sciences(Robert C. Duncan,...)(Second edition)1989
Recommended books and references (scientific journals, reports...)	Any book or reference in mathematics well as in biostatistics
Electronic References, Websites	Depending on the type of topic discussed during the week

Course Description Form

1. Course Name:					
Computer Sciences I					
2. Course Code:					
PH2106					
3. Semester / Year:					
Second semester / First level					
4. Description Preparation Date:					
2026-2025					
5. Available Attendance Forms:					
Full-time and official attendance hours					
6. Number of Credit Hours (Total) / Number of Units (Total)					
3/2					
7. Course administrator's name (mention all, if more than one name)					
Name: Redhaa Fadhil Sabri Namaa Email: Redhaa.Fadhil@alayen.edu.iq					
8. Course Objectives					
Course Objectives			1- Utilize the computer for fundamental tasks. 2- Identify and discuss the hardware components of the computer system. 3- Creating documents using a word processor and creating presentations. 4- Conducting research on the internet.		
9. Teaching and Learning Strategies					
Strategy		1-lectures included multimedia lectures 2- PowerPoint presentation 3- practical work 4- open discussion 5- class activity			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Understanding the computer, its hardware and software components, and input and output devices.	Introduction to Computer	1-lectures included multimedia lectures	1-written exam 2- Quiz 3-midterm exam
2	3	Learn about computer components, Hardware parts, I/O units, and memory types.	Computer Components	2- PowerPoint presentation	4- final exam

3	3	Basic CPU Components, Computer ports, Personal Computers (types and features)	Computer Components	3- open discussion 5- class activity 6-Self learning	5- Laboratory reports
4	3	Operating system, Basics of common OS, the user interface and using the Mouse technique	Operating System and Graphical User Interface.		
5	3	Use of a common icon, Status Bar, Concept of folders.	Operating System and Graphical User Interface.		
6	3	Word processing basics: Create, delete, open, and close documents, text and formatting	Word Processing.		
7	3	Create and manage tables, styles, and themes, as well as headers and footers.	Word Processing.		
8	3	Introduction, Creating and formatting a spreadsheet, sorting and filtering data, using formulas and functions.	Spreadsheet.		
9	3	Introduction, create a presentation, insert an image, and use a template.	Presentation Software.		
10	3	Types of networks, types of browsers, World Wide Web, and URLs.	Introduction to the internet and web browser.		
11	3	Basics of E-mails, getting an email account, and using email	Communications and email		
12	3	What is a Cloud, Google Docs, Google Sheets, Drive, etc.	Introduction to Cloud.		

11. Course Evaluation

Written exam 70 marks
Midterm 20 marks
Coursework 10 marks
Total =100 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Graham Brown, David Watson, "Cambridge IGCSE Information and Communication Technology", 3rd Edition (2020).
Main references (sources)	Alan Evans, Kendall Martin, Mary Anne Poatsy, "Technology in Action Complete ", 16th Edition (2020).
Recommended books and references (scientific journals, reports...)	Ahmed Banafa, "Introduction to Artificial Intelligence (AI)", 1st Edition (2024).
Electronic References, Websites	Microsoft Office 2019 step by step 1st Edition by Curtis Frye & Joan Lambert.

Course Description Form

1.Course Name:	
Human Anatomy & Histology	
2.Course Code:	
PH1201	
3.Semester / Year:	
first semester /first year	
4.Description Preparation Date:	
1/1/2026	
5.Available Attendance Forms:	
Full-time and official attendance hours	
6.Number of Credit Hours (Total) / Number of Units (Total)	
2x15= 30 hrs (theoretical) 1x15=15 hrs (practical) \Total Credits 4	
7.Course administrator's name (mention all, if more than one name)	
Name: Karema mohamed Abulfotouh soliman Email: Karema.mohammed@alayer.edu.eg	
8.Course Objectives	
Course Objectives	1) Learning the names and functions of anatomical structures. 2) Provide comprehensive understanding of how abnormal anatomy can lead to disease. 3) To acquire a basic background in histology and to understand the properties of cells and their interactions with one another as components of tissues and organs 4) To be able to describe the normal structure and function of various cell types, tissues, and organs, and to differentiate their histological structures from each

	other through microscopic examination.
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9. Teaching and Learning Strategies

Strategy	PowerPoint and Multimedia presentation Class discussion. Visual aids: Utilize visual aids such as pictures, charts, graphs, diagrams Teaching Strategies • Interactive Lectures: Core concepts are delivered using visual aids, diagrams, and clinical correlations to enhance understanding. • Small Group Discussions: Students engage in guided discussions to promote critical thinking and peer learning. • Demonstrations and Practical Sessions: Use of anatomical models, histology slides, and virtual microscopy to reinforce theoretical knowledge. • Problem-Based Learning (PBL): Real-life clinical scenarios are used to develop problem-solving and analytical skills. • Case-Based Learning: Integration of clinical cases to link basic science concepts with clinical relevance. • E-learning and Multimedia Resources: Recorded lectures, animations, and online resources support self-directed learning. • Student-Centered Learning: Encouraging active participation through questioning, presentations, and group activities. Learning Strategies • Self-Directed Learning: Students are encouraged to prepare before class and review learning materials independently. • Collaborative Learning: Group assignments and peer teaching enhance communication and teamwork skills. • Active Learning: Use of quizzes, concept maps, and in-class activities to reinforce key concepts. • Practical Skill Development: Hands-on practice with models,
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slides, and lab exercises to improve observational skills.

- **Reflective Learning:** Students reflect on feedback and learning outcomes to improve performance.
- **Formative Assessment:** Continuous assessments help students identify strengths and areas for improvement.

11.Course Structure

Course Structure (Theory)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Identify the standard anatomical positions and anatomical terminology. They will describe major body regions, body cavities and their contents. They will define histology and explain the basic concepts of tissue, organ, and system organization. They will relate microscopic structure to overall body function.	General anatomy :Anatomical Positions ,Body regions ,Body cavities. Introduction to Histology: Definition , basic concepts of cell, tissue , organ , system .	smartboard/ Presentation slides/ discussion	oral questions and written exams
2	3	Classify the four primary tissue types based on structure and function. They will recognize the general histological features of epithelial, connective,	Overview of the Four Primary tissue types -Epithelial Tissues , Connective Tissues, Muscular Tissues, Nervous Tissue	smartboard/ Presentation slides/ discussion	oral questions and written exams

		muscular, and nervous tissue			
3	3	Describe the anatomy and classification of bones and joints. They will relate structural features to movement and support functions.	Musculoskeletal System (- Bones & Joints):	smartboard/ Presentation slides/ discussion	oral questions and written exams
4	3	Describe the anatomy of the heart and blood vessels. They will identify histological layers of arteries, veins, capillaries.	Circulatory System (Cardiovascular System):Anatomy & Histology	smartboard/ Presentation slides/ discussion	oral questions and written exams
5	3	Explain the anatomy and functions of the lymphatic system. They will describe components and functions of blood.	Circulatory System (Lymphatic System) & Blood.	smartboard/ Presentation slides/ discussion	oral questions and written exams
6	3	Describe the anatomy and histology of the oral cavity, pharynx, esophagus, and stomach. They will relate structural features to digestive functions.	Digestive System (Part 1 - Upper GIT): Oral cavity, pharynx, esophagus, stomach	smartboard/ Presentation slides/ discussion	oral questions and written exams
7	3	Describe the anatomy and histology of the intestines and accessory digestive organs. They will explain how these structures contribute to digestion and absorption.	Digestive System (Part 2 - Lower GIT & Accessory Organs): Small intestine, large intestine, rectum, anus. Salivary glands, pancreas, liver, gallbladder.	smartboard/ Presentation slides/ discussion	oral questions and written exams
8	3	Describe the organization of the central and peripheral nervous systems. They will identify basic histological features.	Nervous System: Anatomy & Histology: Central Nervous System (brain, spinal cord)	smartboard/ Presentation slides/ discussion	oral questions and written exams

		features of neural tissues.	and Peripheral Nervous System (nerves, ganglia), basic organization		
9	3	Describe the anatomy of the respiratory tract and lungs. They identify histological features involved in gas exchange.	Respiratory System: Anatomy & Histology	smartboard/ Presentation slides/ discussion	oral questions and written exams
10	3	Describe the anatomy of the kidneys and urinary tract. They will explain histological structure of the nephron and its functional role.	Urinary System: Anatomy & Histology	smartboard/ Presentation slides/ discussion	oral questions and written exams
11	3	Describe the anatomical layers of the skin and its accessory structures. They will differentiate between thick and thin skin histologically.	Integumentary System (The Skin): - Anatomy: Layers of the skin (epidermis, dermis, hypodermis). Histology: Detailed histology of thick and thin skin, epidermal layers, accessory structures (hair follicles, sebaceous glands, sweat glands).	smartboard/ Presentation Slides /discussion	oral questions and written exams
12	3	Identify the major endocrine glands and their anatomical locations. They relate gland structure to hormonal function.	Endocrine System: Anatomy pituitary, thyroid, parathyroid, adrenal, pancreas-islets of Langerhans, pineal, gonads	smartboard/ Presentation slides/ discussion	oral questions and written exams

	3	Identify histological features of major endocrine glands. They correlate microscopic structure with hormone secretion.	Endocrine System: Histology pituitary, thyroid, parathyroid, adrenal glands, islets of Langerhans, and pineal gland		
	3	Describe the anatomy and histology of male reproductive organs. They relate structural features to sperm production and hormone secretion.	Male Reproductive System:		
	3	Describe the anatomy and histology of female reproductive organs. They relate structural features to reproductive function and hormone regulation.	Female Reproductive System:		

12.Course Evaluation

Midterm Exam 15 marks

Quizzes and activities 5 marks

Practical 20 marks

Final Exam 60 marks

13.Learning and Teaching Resources

Required textbooks (curricular books only)

1. "Atlas of Human Anatomy" by Frank H. Netter: A detailed atlas of human anatomy.
2. "Clinically Oriented Anatomy" by Keith L. Moore et al.: focuses on clinical applications of anatomy.
3. "Gray's Anatomy for Students" by Richard Drake et al.: A comprehensive explanation of anatomy with a focus on students' needs.
4. "Essential Clinical Anatomy" by Keith L. Moore et al.: A brief anatomical reference covering the key points.

	5. "Sobotta Atlas of Human Anatomy": an accurate depiction of anatomy with a focus on applied aspects.
Main references (sources)	1) Anatomy and Physiology for Healthcare by Paul Marshall; Beverly Gallacher; Jim Jolly; Shupikai Rinomhota 2) Atlas of Human Anatomy by Frank H. Netter 3) Basic Histology: text and Atlas, 11th ed. BY Luiz Carlos, Uchoa Junqueira 4) Wheaters functional histology: a text and colour atlas 6th ed. BY Yung , Barbara
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1.Course Name:					
Medical Physics					
2.Course Code:					
3.Semester / Year:					
First semester /first year					
4.Description Preparation Date:					
2026-2025					
5.Available Attendance Forms:					
Full-time and official attendance hours					
6.Number of Credit Hours (Total) / Number of Units (Total)					
1x15= 15 hrs (theoretical) 2x15=30 hrs (practical) /number of units = 2					
7.Course administrator's name (mention all, if more than one name)					
Name: Sara Salah Email: sara.salah@alayen.edu.iq					
8.Course Objectives					
Course Objectives			1) Gives students the ability to deal with the concepts of physics, emphasizes the knowledge and skills required to efficiently discharge the duties and responsibilities of the pharmacist. 2) students will be able to understand the physical terminology and abbreviation used to describe the lecture, and the application in medical field.		
9.Teaching and Learning Strategies					
Strategy		-PowerPoint and Multimedia presentation -Class discussion. -Visual aids: Utilize visual aids such as pictures, charts, graphs, diagrams			
10.Course Structure					
Course Structure (Theory)					
Wee k	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1	These concepts help students understand the scientific method in physics and the importance of accurate measurement and	General concepts: Method of physics and standards;	smartboard/ Presentation slides/ discussion	Oral questions and written exams

		standards. They also introduce thermodynamic systems and their properties, as well as the principle of energy conservation and energy transfer in physical and medical systems.	thermodynamics system and system properties; conservation of energy principle		
2	1	Students learn the basic concepts of pressure and temperature, including different temperature scales, and how to describe the state of matter using equations of state. They also understand the difference between ideal and real gases and the general gas laws and their applications.	Pressure; temperature and temperature scales (Celsius, Fahrenheit, Kelvin); equation of state; ideal gas and real gas; general law of gases.		
3	1	Students learn the concepts of heat and energy, mechanical work, and power, and how energy is transferred and transformed. They also understand the First Law of Thermodynamics and the fundamental gas laws such as Boyle's and Charles's laws and their practical applications.	Heat and energy; work and mechanical forms of work; power; the 1st law of thermodynamics; Boyles and Charles law.	smartboard/ Presentation slides/ discussion	Oral questions and written exams
4&5	2	Students learn the physical principles behind medical devices used for blood glucose monitoring, parenteral infusion, and cardiac output measurement. They also understand how these devices	Medical Devices for: Blood Glucose Monitoring ,Parenteral Infusion Devices , Cardiac Output Measurement	smartboard/ Presentation slides/ discussion	Oral questions and written exams

		operate, their clinical applications, and the importance of accuracy and safety in medical measurements.			
6	1	Students learn the basic principles, components, and operation of implantable cardiac pacemakers. They also understand their medical applications, physiological effects on the heart, and the importance of safety and reliability in their use.	Implantable Cardiac Pacemakers I	smartboard/ Presentation slides/ discussion	Oral questions and written exams
7	1	Students learn the principles and function of the electrocardiogram (ECG), including how it records the heart's electrical activity. They also understand how to interpret ECG signals, recognize normal and abnormal heart rhythms, and apply this knowledge in clinical settings.	Electrocardiogram ECG	smartboard/ Presentation slides/ discussion	Oral questions and written exams
8	1	Students learn the principles and operation of electroencephalography (EEG), which records the brain's	Electroencephalography EEG	smartboard/ Presentation slides/ discussion	Oral questions and written exams

		electrical activity. They also understand how to interpret EEG patterns, identify normal and abnormal brain activity, and apply this knowledge in clinical diagnostics and research.			
9	1	Students learn the fundamental laws of radiation, including Kirchhoff's, Planck's, Stefan-Boltzmann, and Wien's laws, as well as concepts like black body and albedo. They also understand the mechanisms of heat transfer—radiation, convection, and conduction—and their applications in physics and medical contexts.	Radiation: Kirshoffs law; planks law; Stefan- Boltzman law; Wiens law; Black body and Albedo; Heat transfer (radiation, convection, conduction).	smartboard/ Presentation slides/ discussion	Oral questions and written exams
10&11	2	Students learn the principles of X-rays and their spectra, how X-rays are absorbed, and the effects of ultraviolet (UV) and infrared (IR) radiation. They also understand the medical and biological effects of radiation and its applications in diagnosis and therapy.	X-Ray and X-Ray spectra; absorption of X-Ray; U.V and IR effects; medical and biological effects of radiation;	smartboard/ Presentation slides/ discussion	Oral questions and written exams
12	1	Students learn the principles and applications of radiotherapy and radioactive iodine in medical treatment. They also understand how radiation targets diseased tissues, its therapeutic effects, safety precautions, and biological interactions.	Radiotherapy, radioactive iodine.	smartboard/ Presentation slides/ discussion	Oral questions and written exams

13	1	Students learn the principles and operation of Magnetic Resonance Imaging (MRI), including how it uses magnetic fields and radio waves to produce detailed images of the body. They also understand MRI applications in diagnosis, safety considerations, and the interpretation of images for medical purposes.	Magnetic Resonance Imaging MRI		
14	1	Students learn the principles and operation of Computed Tomography (CT) scanning, including how X-rays are used to create cross-sectional images of the body. They also understand CT applications in medical diagnosis, image reconstruction, and safety considerations regarding radiation exposure.	Computed Tomography CT scan		
15	1	Students learn the principles of diffusion, describing how particles move from regions of high concentration to low concentration, and rheology, which studies the flow and deformation of materials. They also understand the applications of these concepts in biological systems, medical fluids, and material science.	Diffusion and rheology		
		11.Course Evaluation			
		Midterm Exam 20 marks Practical part 20 marks Final Exam 60 marks			
		12.Learning and Teaching Resources			
Required textbooks (curricular books, if any).			1) Physics for Biology and Medical Students, 2nd ed.		

	2) Medical Instruments and Devices: principles and practices: Schreiner, Steven CRC Press, 2015.
Main references (sources).	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites.	

Course Description Form

1. Course Name:	
organic Chemistry I	
2. Course Code:	
PH1204	
3. Semester / Year:	
Second semester / First level	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3x15= 45 hrs (theoretical) 2x15=30 hrs (practical) /number of units = 4	
7. Course administrator's name (mention all, if more than one name)	
Name: Ranza Ahmed Abdo Hassan Email: Ranza.ahmed@alayen.edu.iq	
8. Course Objectives	
Course Objectives	1-This course provides a foundational understanding of organic chemistry, focusing on the relationship between the structure of carbon-based molecules and their physical and chemical properties. 2- The curriculum progresses logically from fundamental principles of bonding to the chemistry of major hydrocarbon families, three-dimensional structure, and key functional groups, culminating with the unique chemistry of aromatic compounds. 3- Each topic is crucial for building a solid foundation in organic chemistry, which is essential for understanding the design and synthesis of pharmaceutical compounds.
4- Teaching and Learning Strategies	
Strategy	1-lectures included multimedia lectures 2- power point presentation

		3– practical work 4– open discussion 5– class activity 6–Self learning			
5– Course Structure					
Week	hrs	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Introduction: An overview of organic chemistry principles and their relevance to pharmaceuticals.	Introduction (Structure and properties: Atomic and molecular orbitals, Hybrid orbitals, Intermolecular forces, Polarity, Structure and physical properties)	1–lectures included multimedia lectures 2– power point presentation 3– open discussion 5– class activity 6–Self learning	1–written exam 2– Quiz 3– midterm exam 4– final exam
2	4	Study of the simplest hydrocarbons, their properties, and reactions	Alkanes and methane.		
3	4	Detailed exploration of alkenes, including their structure, properties, and reactions.	Alkenes		
4	3	Examination of alkynes and dienes, focusing on their unique chemical behaviors.	Alkynes and dienes.		

5	3	Study of cyclic hydrocarbons, their stability, and reactions.	Cycloalkanes.		
6–8	8	Understanding the three-dimensional arrangement of atoms in molecules and its impact on chemical reactions.	Stereochemistry I & II		
9	3	Exploration of alkyl halides, their properties, and reactions.	Alkyl halides.		
10–11	6	Study of these functional groups, their synthesis, and reactions.	Alcohols and ethers.		
12	4	Describe the structure, properties, and acidity of phenols. Understand the reactions of phenols, including electrophilic substitution and oxidation.	Phenols.		

13–15	7	–Understand the structure and stability of benzene and other aromatic compounds –Explain the mechanism of electrophilic aromatic substitution reactions. –Identify and describe the properties and reactions of arenes and their derivatives.	Aromatic Hydrocarbons (includes benzene, electrophilic aromatic substitution, arenes and their derivatives).		
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6– Course Evaluation

Written exam 60 marks

Midterm 10 marks

Practical exam 10 marks

Collective Theo practical exam 10 marks

Course work 10 marks

Total =100 marks

7– Learning and Teaching Resources

Required textbooks (curricular books, if any)	Organic Chemistry: Structure and Function (8th Edition) by Vollhardt and Schore. Organic Chemistry by Robert T. Morrison and Robert N. Boyd.
Main references (sources)	ORGANIC CHEMISTRY BY SMITH – Organic Chemistry: by John McMurry 10th Ed, 2023

Recommended books and references (scientific journals, reports...)	Scientific journals in basic specializations
Electronic References, Websites	Websites of Arab and foreign universities and pharmaceutical companies

Course Description Form

1. Course Name:	
Pharmaceutical calculation	
2. Course Code:	
PH1202	
3. Semester / Year:	
Second semester/1 st year	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours/week (theoretical), 2 hours/week (practical), total units = 3	
7. Course administrator's name (mention all, if more than one name)	
Name: Assist. Lecturer Mays Mazin AL-Hamadanl Email: Mais.yahya@alayen.edu.iq	
8. Course Objectives	
Course Objectives	1.The use of calculations in pharmacy is varied and broad-based. As pharmaceutical 2.calculations are concerned in several areas, including commercial and research, especially in industry, academics, and government institutions. 3.Applications of pharmaceutical calculations include: the physical and chemical properties of the drug, the biological effectiveness and the speed of absorption of the drug, the spread of the drug in the body, the metabolic changes of the drug and its excretion, statistical information for research and clinical studies of drugs, the development and formulation of drug products, the calculation of drug doses, Pharmacoeconomics and other fields

9. Teaching and Learning Strategies

- Strategy**
- 1– Lectures
 - 2– Class discussion
 - 3– practical work
 - 3– Quizzes
 - 4–Reports

10. Course Structure (Theory)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Analyzing medical orders, identifying their essential components, decoding abbreviations, and ensuring accurate medication processing.	Interpretation of prescription or medication orders.	smartboard/ Presentation slides/discussion	oral questions and written exams
2	2	Mastering the Metric, Apothecaries', and Household systems, with a focus on unit conversions for precise dosage and compounding.	Systems of measurement	smartboard/ Presentation slides/discussion	oral questions and written exams
3	2	Calculating the relationship between mass and volume to ensure accuracy in pharmaceutical formulations and liquid measurements	Density, specific gravity and specific volume	smartboard/ Presentation slides/discussion	oral questions and written exams
4	2	Understanding various methods to express pharmaceutical	Percent strength, ratio strength, and other	Smartboard/ Presentation slides/discussion	oral questions and written exams

		strength, including percent and ratio strengths, for accurate preparation	expressions of concentration		
5	2	Computing precise medication doses based on specific patient parameters to ensure safe and effective therapy.	Calculation of doses, calculation of doses patient parameters	smartboard/ Presentation slides/discussion	oral questions and written exams
6	2	learning to scale pharmaceutical formulas up or down while maintaining the correct proportion of ingredients.	Reducing and enlarging formulas	smartboard/ Presentation slides/discussion	oral questions and written exams
7 8	4	Techniques for modifying product concentrations and utilizing stock solutions in pharmaceutical compounding	Altering product strength, use of stock solutions, and problem solving by alligation	smartboard/ Presentation slides/discussion	oral questions and written exams
9 10	4	Designing and preparing solutions that maintain physiological pH and osmotic balance for safe administration.	Isotonic and buffer solutions	smartboard/ Presentation slides/discussion	oral questions and written exams
11 12	4	Calculating ionic concentrations in milliequivalents, millimoles, and milliosmoles for fluid and electrolyte therapy.	Electrolyte solutions (milliequivalents, millimoles and milliosmoles)	smartboard/ Presentation slides/discussion	oral questions and written exams
13 14	6	Advanced calculations for	. Intravenous infusions,	smartboard/ Presentation	oral questions

15		sterile parenteral admixtures and determining accurate infusion delivery speeds.	parenteral, admixtures, rate-of-flow calculations use of stock solutions.	slides/discussion	and written exams
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11. Course Evaluation

Mid term Exam 15 marks
 Quizzes and activities 5 marks
 Practical 20 marks
 Final Exam 60 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Pharmaceutical Calculation, Howard C. Edition 2010 Wolters Kluwer Lippincott Williams &Wilkins.
Main references (sources)	1-Pharmaceutical Calculation, Howard C. Edition 2010 Wolters Kluwer Lippincott Williams &Wilkins. 2-Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 3ed Michael E. Aulton (Author) Churchill,
Recommended books and references (scientific journals, reports...)	none
Electronic References, Websites	

Course Description Form

1. Course Name:					
Physiology 1					
2. Course Code:					
PH1104					
3. Semester / Year:					
First year/ Second- semester /2025-2026					
4. Description Preparation Date:					
2026					
5. Available Attendance Forms:					
In class only					
6. Number of Credit Hours (Total) / Number of Units (Total)					
3 hours/ week (theoretical) / 4					
7. Course administrator's name (mention all, if more than one name)					
Name: Lec. Mohammad Jabbar Makki Email: Mohammed.jabbarmakki@alayer.edu.iq					
8. Course Objectives					
Course Objectives		- To learn the principle of human physiology and the body organized. - To learn the cell structure, functions, and signaling - To learn how the nervous system works			
9. Teaching and Learning Strategies					
Strategy		To achieve the desired educational goal, a set of educational activities take place during the course, including: - Examination - Seminars - Workshops - Homework - Class activity - Open discussion			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1-2	6	Introduction to physiology: How is the body organized		-In class Study -using textbooks	• Examinations • Seminars • Oral examination
3-4	6	Homeostasis: Framework for Human Physiology		- using electronic sources	
5-6	6	Cellular structure, protein, and metabolic pathways		-using library of college	
7-8	6	Movement of Molecules across Cell Membranes			
9	3	Cell signaling in physiology			
10-11	6	Neuronal signaling and the structure of the nervous system			
12-13	6	Sensory physiology			

11.Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports.....etc

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Vander's Human physiology: the mechanisms of body function. Eric P. Widmaier, Hershel Raff, Kevin T. Strang, last edition
Main references (sources)	Vander's Human physiology: the mechanisms of body function. Eric P. Widmaier, Hershel Raff, Kevin T. Strang, last edition
Recommended books and references (scientific journals, reports...)	research gate google scholar Scopus PubMed
Electronic References, Websites	google

Course Description Form

1. Course Name:	
Physiology II	
2. Course Code:	
PH2204	
3. Semester / Year:	
2 nd semester/ 2 nd year	
4. Description Preparation Date:	
2026–2025	
5. Available Attendance Forms:	
Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 hours/week (theoretical), 2 hours/week (practical), total units = 4	
7. Course administrator's name (mention all, if more than one name)	
Name: Karema mohamed Abuelfotouh soliman Email: Karema.mohammed@alayen.edu.eg	
8. Course Objectives	
Course Objectives	This Physiology course focuses on key systems of the human body, including the endocrine system, reproductive system, gastrointestinal system, and blood physiology. By the end of the course, students will be able to: 1– Understand System–Specific Functions a– Describe the hormonal regulation and functions of the endocrine system, including its role in growth, metabolism, and homeostasis. b– Explain the physiological processes of the reproductive system, including gametogenesis, hormonal control, and reproductive cycles. c– Analyze the functions of the gastrointestinal system, focusing on digestion, absorption, and motility. d– Understand the components, functions, and regulation of blood, including hematopoiesis, hemostasis, and immune responses. 2– Integrate Knowledge Across Systems

	a– Demonstrate an understanding of how these systems interact to maintain overall homeostasis and respond to internal and external changes. 3– Apply Physiological Principles a– Relate physiological mechanisms to clinical conditions and pathophysiological scenarios involving these systems. b– Analyze case studies and laboratory data to assess normal and abnormal functions. 4– Develop Critical Thinking Skills a– Solve problems related to system dysfunctions, such as endocrine disorders, blood abnormalities, or gastrointestinal diseases. b– Propose evidence–based solutions to maintain or restore normal physiological functions. 5– Foster Lifelong Learning a– Encourage further exploration of advances in physiology and their applications in healthcare and biomedical research. b– Appreciate the critical role of these systems in sustaining human health and responding to disease.
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9. Teaching and Learning Strategies

Strategy	1. Interactive Lectures • Present complex physiological systems (e.g., cardiovascular, renal, endocrine) using diagrams, animations, and flowcharts. • Engage students through Q&A sessions, mini–quizzes, and problem–solving during lectures. 2. Case–Based Learning (CBL) • Integrate clinical cases such as heart failure, renal failure, or endocrine disorders to apply theoretical knowledge. • Encourage analytical thinking and link physiology with pharmacy practice. 3. Laboratory Practicals and Experiments • Demonstrate experiments on blood pressure regulation, hormone assays, nerve conduction, and respiratory physiology.
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- Teach students data collection, interpretation, and reporting skills.

4. Demonstrations and Visual Aids

- Use anatomical models, videos, and simulations to visualize organ systems and dynamic physiological processes.
- Enhance understanding of complex physiological mechanisms like cardiac cycle or renal filtration.

5. Small Group Discussions and Tutorials

- Organize group discussions on physiological pathways and disease mechanisms.
- Promote collaboration, critical thinking, and peer learning.

6. Concept Mapping and Flow Diagrams

- Encourage students to create diagrams linking organ systems, hormones, and feedback mechanisms.
- Improve comprehension and memory retention of integrated physiological processes.

7. Quizzes, Polls, and Formative Assessments

- Conduct in-class quizzes, clicker questions, or online polls for immediate feedback.
- Help students identify gaps in understanding and reinforce learning.

8. Simulation and Virtual Labs

- Use computer simulations for cardiovascular dynamics, endocrine feedback, renal function, and respiratory physiology.
- Allow students to safely explore physiological responses under different conditions.

9. Self-Directed Learning and E-Learning Modules

- Assign pre-readings, online videos, or interactive modules before class.
- Encourage independent learning and preparation for advanced topics.

10. Peer Teaching and Presentations

- Assign topics for students to teach their peers or present mini-seminars.
- Reinforce knowledge, improve communication, and develop teaching skills.

11. Flipped Classroom Approach

- Provide lecture material online and dedicate class time for problem-solving, case analysis, and discussions.
- Promote active learning and application of theoretical concepts.

12. Clinical Integration Sessions

- Connect physiological knowledge with pharmacology and patient care scenarios.
- Enhance understanding of pathophysiology and therapeutic interventions.

10. Course Structure (Theory)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	students will be able to: Define hormones and endocrine signaling Classify hormones based on chemical nature	Basic Concepts of Endocrine Regulation	smartboard/ Presentation slides/ discussion	oral questions and written exams
2	3	Explain the role of the hypothalamus in endocrine regulation Identify hypothalamic releasing and inhibiting hormones	Hypothalamic Regulation of Hormonal Function	smartboard/ Presentation slides/ discussion	oral questions and written exams

3	3	Distinguish between anterior and posterior pituitary Identify pituitary hormones and their target organs	The Pituitary Gland	smartboard/ Presentation slides/ discussion	oral questions and written exams
4	3	Differentiate between hypo- and hyperthyroidism Explain the role of thyroid hormones in growth and metabolism	Thyroid Gland	smartboard/ Presentation slides/ discussion	oral questions and written exams
5	3	Describe the adrenal response to stress Recognize disorders related to adrenal dysfunction	The Adrenal Medulla & Adrenal Cortex	smartboard/ Presentation slides/ discussion	oral questions and written exams
6	3	Describe functions of osteoblasts and osteoclasts Recognize disorders related to bone metabolism	Hormonal Control of Calcium & Phosphate Metabolism & the Physiology of Bone	smartboard/ Presentation slides/ discussion	oral questions and written exams
7	3	Explain hormonal regulation of ovulation Describe physiological	Reproductive Development & Function of the Female	smartboard/ Presentation slides/ discussion	oral questions and written exams

		changes during pregnancy (overview)	Reproductive System		
8	3	Explain the role of testosterone Describe development of male secondary sexual characteristics	Function of the male Reproductive System	smartboard/ Presentation slides/ discussion	oral questions and written exams
9	3	Differentiate between fed and fasting states Explain basic pathophysiology of diabetes mellitus	Endocrine Functions of the Pancreas & Regulation of Carbohydrate Metabolism	smartboard/ Presentation slides/ discussion	oral questions and written exams
10	3	Explain neural and hormonal regulation of digestion Describe coordination of GI activities Relate GI function to nutrient absorption	Overview of Gastrointestinal Function & Regulation	smartboard/ Presentation slides/ discussion	oral questions and written exams
11	3	Explain principles of balanced nutrition Relate digestion to energy metabolism	Digestion, Absorption & Nutritional Principles	smartboard/ Presentation Slides /discussion	oral questions and written exams
12	3	Describe neural control of GI motility	Gastrointestinal Motility	smartboard/ Presentation slides/	oral questions

		Explain swallowing and defecation reflexes Identify disorders related to abnormal motility		discussion	and written exams
13	3	Explain storage functions of the liver Relate liver function to systemic metabolism	Transport & Metabolic Functions of the Liver	smartboard/ Presentation Slides /discussion	oral questions and written exams
14	3	Describe components of blood Explain functions of plasma and blood cells Describe hemostasis and clotting mechanisms	Blood as a Circulatory Fluid	smartboard/ Presentation slides/ discussion	oral questions and written exams
15	3	Explain principles of blood flow and pressure Describe regulation of circulation	The Dynamics of Blood & Lymph Flow	smartboard/ Presentation slides/ discussion	oral questions and written exams

11. Course Evaluation

Midterm Exam 15 marks

Quizzes and activities 5 marks

Practical 20 marks

Final Exam 60 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Guyton and Hall Textbook of Medical Physiology
Main references (sources)	Ganong's Review of Medical Physiology
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	



Course Description Form

1. Course Name:						
Biochemistry II						
2. Course Code:						
PH3204						
3. Semester / Year:						
Second /Third						
4. Description Preparation Date:						
2025-2026						
5. Available Attendance Forms:						
In-person attendance						
6. Number of Credit Hours (Total) / Number of Units (Total)						
4 units						
7. Course administrator's name (mention all, if more than one name)						
Dr. Rand Salah						
8. Course Objectives						
Course Objectives				- Learning of the fundamentals of cellular lipids, and amino acids and their associati diseases. - Providing students with the necessary techn biochemistry.		
9. Teaching and Learning Strategies						
Strategy				- Presentation and recitation - Interactive discussions		
				- Brainstorming - Research and induction		
10. Course Structure						
Week	Hours	Required Learning Outcomes	Unit	Learning method	Evaluation method	

1	1	The application of the laws of thermo- dynamics in biological systems, the relationship between endothermic and exothermic reactions, the function of adenosine triphosphate as the “energy currency” for cells.	Bioenergetics: The Role of ATP	Lectures, Discussions, and Reports	Exam and classroom activities
1	2	Explain what is meant by anabolic, catabolic and combined metabolic pathways; A description of the metabolic process at the tissue, organ, and subcellular levels; Methods of regulating of the flow of metabolites through metabolic pathways; How to provide metabolic fuel supply in both the fed and the fasting states.	Overview of metabolism and the provision of metabolic fuels		
2	3	Description of the pathway of glycolysis, its regulation, and the possibility of its occurrence under anaerobic conditions.	Glycolysis and the oxidation of pyruvate		

		The differences between the roles of glucokinase and hexokinase in glycolysis; Description of the pyruvate dehydrogenase reaction and its regulation.			
3	3	Description of the citric acid cycle reactions, its regulation, and emphasizing the reactions that lead to the production of reducing equivalents; Explain the importance of vitamins in citric acid cycle; Explain how the cycle provides a pathway for amino acid catabolism and a pathway for their synthesis.	The citric acid cycle		
4	3	Description of the four protein complexes involved in the transfer of electrons through the respiratory chain; How electron transfer through the respiratory chain generates ATP through the process of oxidative phosphorylation; List	The respiratory chain and oxidative phosphorylation		

		examples of the common toxins that interfere with electron transport or oxidative phosphorylation and identify their sites of action.			
5	3	Description of the structure of glycogen and its importance as a carbohydrate store; The synthesis and catabolism of glycogen and how the two processes are regulated; Description of the different types of glycogen storage diseases.	Metabolism of glycogen		
6	3	The importance of gluconeogenesis in glucose homeostasis; the pathway of gluconeogenesis, and how glycolysis and gluconeogenesis are mutually regulated; how plasma glucose concentration is maintained within certain limits in the fed and the fasting states.	Gluconeogenesis and the control of blood glucose		
8	3	The pentose phosphate pathway and its importance;	The Pentose Phosphate Pathway and other		

		the uronic acid pathway and its importance; the consequences of consuming large amounts of fructose; the structure and physiological importance of galactose; the consequences of genetic defects of glucose-6-phosphate dehydrogenase deficiency, the uronic acid pathway, and fructose and galactose metabolism.	pathways of hexose metabolism		
9	1	Indicate the intermediate compounds of the citric acid cycle and glycolysis that are precursors of certain amino acids; the key role of transaminases in amino acid metabolism; Explain the process by which 4-hydroxyproline, 5-hydroxylysine and selenocysteine are formed in some proteins;	Biosynthesis of the nutritionally nonessential amino acids		

		the synthesis of some amino acids through the assimilation of free ammonia; the synthesis of some amino acids using other amino acids.			
9	2	Description of protein metabolism, its functions, its speed determinants, and cellular protein catabolism pathways; the central roles of transaminases, glutamate dehydrogenase, and glutaminase in nitrogen metabolism; description of the cycle of urea synthesis, its regulation, and its metabolic defects.	Catabolism of proteins and of amino acid nitrogen		
10	1	Illustration of the catabolic pathways of amino acids' carbon skeletons and their major metabolic fates; the clinically important metabolic disorders in this regard.	Catabolism of the carbon skeletons of amino acids		
10	1	The involvement of amino acids as precursors in the	Conversion of amino acids to		

		biosynthesis variety of biological molecule other than proteins.	specialized products		
10	1	The structure and nomenclature of porphyrins; the pathway of heme synthesis and its catabolism; the causes and general clinical features of different porphyrias.	Porphyrins and bile pigments		
11	3	Fatty acids transportation in the blood; activation of fatty acids and their transportation into mitochondria for oxidation; the beta oxidation pathway; ketone bodies formation and the pathological conditions that accompany their excessive formation.	Oxidation of fatty acids		
12	3	Description of the acetyl-CoA acetylase reaction and the mechanisms of regulating its activity to control the rate of fatty acid synthesis;	Biosynthesis of fatty acids and eicosanoids		

		the synthesis of long-chain fatty acids and required cofactors; the synthesis of polyunsaturated fatty acids.			
13	3	The catabolism of triacylglycerols and the fate of the resulting metabolites; the synthesis of triacylglycerols, inositol phosphoglycerols, cardiolipin, triacylglycerols, plasmogens, and platelet-activating factor; the role of different phospholipases in the degradation and remodeling of phospholipids; the synthesis of sphingolipids.	Metabolism of acylglycerols and sphingolipids		
14	3	Description of the four main plasma lipoproteins and their structure; the transport of lipoproteins to and from the liver and the role of the liver in their metabolism; the metabolism of lipoproteins in the blood and the	Lipid transport and storage		

		delivery of cholesterol from the liver to extrahepatic tissues; the mechanisms by which cholesterol is delivered from extrahepatic tissues and returned to the liver by the reverse cholesterol transport; the processes by which fatty acids are released from triacylglycerol stored in adipose tissue and the role of brown adipose tissue in generating body heat.			
15	3	The importance of cholesterol as a basic structural component in the body, and its pathological role; the pathway of cholesterol biosynthesis and its regulation; the role of plasma lipoproteins in transporting cholesterol among tissues.	Cholesterol synthesis, transport, and excretion		

11.Course Evaluation

Mid-term examination (15 marks)

Quiz and homework (5 marks)

Practical work (20 marks)

Final examination (60 marks)

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)

Harper's Illustrated Biochemistry, 32 ed.

Main references (sources)

Lippincott Illustrated Reviews:
Biochemis
Lehninger Principles of Biochemistry,
8th e

Recommended books and references (scientific journals, reports...)

Electronic References, Websites

Course Description Form

1. Course Name:					
Computer Sciences II					
2. Course Code:					
PH2106					
3. Semester / Year:					
First semester / Second level					
4. Description Preparation Date:					
2025-2026					
5. Available Attendance Forms:					
-Full-time and official attendance hours					
6. Number of Credit Hours (Total) / Number of Units (Total)					
3/2					
7. Course administrator's name (mention all, if more than one name)					
Name: Redhaa Fadhil Sabri Namaa Email: Redhaa.Fadhil@alayen.edu.iq					
8. Course Objectives					
Course Objectives			1- Utilize the computer for fundamental tasks. 2- Identify and discuss the hardware components of the computer system. 3- Creating documents using a word processor and creating presentations. 4- Conducting research on the internet. 5- An introduction to Artificial Intelligence.		
9. Teaching and Learning Strategies					
Strategy		1-lectures included multimedia lectures 2- PowerPoint presentation 3- practical work 4- open discussion 5- class activity			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	What is a network? Types of networks and basic components of a network.	Security and Computer Networking	1-lectures included multimedia lectures	1-written exam 2- Quiz 3-midterm exam
2	3	Concept of E-Commerce, online banking, ATM, and Mobile banking.	E- Commerce		

3	3	What is AI? History of AI, AI techniques.	Introduction to AI	2- PowerPoint presentation 3- open discussion 5- class activity 6-Self learning	4- final exam
4-5	6	AI- Mobile-driven technology, virtual assistant, adaptive learning and real-time translation.	The Role of AI in Modern Smartphones		
6-9	9	Applications in various industries, healthcare and education, and Marketing, robotics and automation.	Applications and tools of AI		
10	3	How AI affects social, AI and international relationships, and AI and the future of humanity	AI and Society		
11	3	AI ethics, Privacy, and the impact of AI on the job market	Ethical challenges in AI		
12	3	The future of AI, research.	The Future of AI		

11. Course Evaluation

Written exam 70 marks
Midterm 20 marks
Coursework 10 marks
Total =100 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Graham Brown, David Watson, "Cambridge IGCSE Information and Communication Technology", 3rd Edition (2020).
Main references (sources)	Alan Evans, Kendall Martin, Mary Anne Poatsy, "Technology in Action Complete ", 16th Edition (2020).
Recommended books and references (scientific journals, reports...)	Ahmed Banafa, "Introduction to Artificial Intelligence (AI)", 1st Edition (2024).
Electronic References, Websites	Microsoft Office 2019 step by step 1st Edition by Curtis Frye & Joan Lambert.

Course Description Form

1.Course Name:	
Medical microbiology I	
2.Course Code:	
PH2102	
3.Semester / Year:	
First semester /second year	
4.Description Preparation Date:	
2025-2026	
5.Available Attendance Forms:	
Full-time and official attendance hours	
6.Number of Credit Hours (Total) / Number of Units (Total)	
3x15= 45 hrs (theoretical) 2x15=30 hrs (practical) /number of units = 4	
7.Course administrator's name (mention all, if more than one name)	
Name: Fatma Mostafa Kamel Email: Fatima.Mustafa@alayen.edu.iq	
8.Course Objectives	
Course Objectives	The Medical Microbiology 1 course introduces pharmacy students to the fundamental concepts of microbiology, emphasizing the role of microorganisms in health and disease. It covers bacterial anatomy, physiology, genetics, sterilization, antibiotics, and microbial interactions with the human body. The course also develops essential laboratory skills, fostering a comprehensive understanding of medical microbiology and its clinical applications.
9.Teaching and Learning Strategies	
Strategy	• PowerPoint and Multimedia presentation

- Class discussion.
- Visual aids: Utilize visual aids such as pictures, charts, graphs, diagrams

11.Course Structure

Course Structure (Theory)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	The student will be able to explain the importance of microbiology in medicine and pharmacy and describe the historical milestones in the development of microbiology.	Introduction: Importance of microbiology, History of microbiology	smartboard/ Presentation slides/ discussion	oral questions and written exams
2	2	The student will be able to describe the structural components of bacterial cells and relate structure to function.	Anatomy of bacteria	smartboard/ Presentation slides/ discussion	oral questions and written exams
3	3	The student will learn the physical and chemical factors affecting bacterial growth, growth curves, and methods of bacterial reproduction.	Bacterial physiology: Physical and chemical growth determinate, growth and growth curves, bacterial reproduction	smartboard/ Presentation slides/ discussion	oral questions and written exams
4	2	The student will be able to explain genetic elements, mutations, and mechanisms of	Genetics: Definition genetic, element, mutation	smartboard/ Presentation slides/	oral questions and written

		gene transfer including transformation, conjugation, and transduction.	(spontaneous, Ger transfer, transformation, conjugation, and gene transduction)	discussion	exams
5	1	The student will understand the principles and applications of recombinant DNA technology in medicine and pharmacy.	Recombinant DNA biotechnology	smartboard/ Presentation slides/ discussion	oral questions and written exams
6	1	The student will be able to describe the processes of bacterial sporulation and germination and their clinical significance.	Sporulation and germination	smartboard/ Presentation slides/ discussion	oral questions and written exams
7	2	The student will learn different sterilization methods and select appropriate techniques for microbial control.	Sterilization (chemical + physical Methods)	smartboard/ Presentation slides/ discussion	oral questions and written exams
8	3	The student will be able to explain antimicrobial chemotherapy and interpret antibiotic sensitivity tests.	Chemotherapy and sensitivity test	smartboard/ Presentation slides/ discussion	oral questions and written exams
9	3	The student will be able to identify Staphylococcus species and explain their pathogenicity and clinical importance.	Staphylococci species	smartboard/ Presentation slides/ discussion	oral questions and written exams
10	3	The student will learn the classification, virulence factors, and diseases caused by Streptococcus	Streptococcus species	smartboard/ Presentation slides/ discussion	oral questions and written exams

		species.			
11	2	The student will be able to describe Bacillus species and differentiate between pathogenic and non-pathogenic strains.	Aerobic Spore-forming bacteria Bacillus species (B. anthracis, B. subtilis, B. cereus)	smartboard/ Presentation Slides /discussion	oral questions and written exams
12	3	The student will learn the characteristics, toxins, and diseases caused by Clostridium species.	Clostridium perfringens; Clostridium tetani; Clostridium botulinum	smartboard/ Presentation slides/ discussion	oral questions and written exams
13	2	The student will be able to explain the pathogenic mechanisms and prevention of diphtheria.	Corynebacterium diphtheriae	smartboard/ Presentation Slides /discussion	oral questions and written exams
14	2	The student will learn the role of these bacteria in human disease and their clinical relevance.	Propionibacterium acnes, Listeria	smartboard/ Presentation slides/ discussion	oral questions and written exams
15	2	The student will be able to describe the pathogenesis, diagnosis, and control of tuberculosis and leprosy.	Mycobacterium tuberculosis; M. leprae	smartboard/ Presentation slides/ discussion	oral questions and written exams
16	6	The student will learn the classification and medical importance of Enterobacteriaceae.	Enterobacteriaceae		
17	6	The student will be able to identify major Gram-negative pathogens and explain their diseases and transmission.	Vibrio, Pseudomonas, Helicobacter pylori, Neisseria spp., Brucella, Proteus		

12.Course Evaluation	
Midterm Exam 15 marks Quizzes and activities 5 marks Practical 20 marks Final Exam 60 marks	
13.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1. "Microbiology: An Introduction" by Gerard J. Tortora, Berdell R. Funke, and Christine L. Case: 2. "Medical Microbiology" by Patrick R. Murray, Ken S. Rosenthal, and Michael A. Pfaller: 3. "Brock Biology of Microorganisms" by Michael T. Madigan, John M. Martinko, Kelly S. Bender, Daniel H. Buckley, and David A. Stahl: 4. "Prescott's Microbiology" by Joanne Willey, Linda Sherwood, and Christopher J. Woolverton: 5. "Clinical Microbiology Made Ridiculously Simple" by Mark Gladwin, William Trattler, and C. Scott Mahan:
Main references (sources)	1. "Medical Microbiology" by Patrick R. Murray, Ken S. Rosenthal, and Michael A. Pfaller: 2. "Brock Biology of Microorganisms" by Michael T. Madigan, John M. Martinko, Kelly S. Bender, Daniel H. Buckley, and David A. Stahl: 3. "Clinical Microbiology Made Ridiculously Simple" by Mark Gladwin and Bill Trattler: 4. "Microbiology: An Introduction" by Gerard

	J. Tortora, Berdell R. Funke, and Christine L. Case: 5. "Principles of Virology" by S. Jane Flint, Vincent R. Racaniello, Glenn F. Rall, and Anna Marie Skalka: 6. Electronic databases and scientific journals: such as PubMed and ScienceDirect,
Recommended books and references (scientific journals, reports...)	C/N H. Roldos de la Sovera, Montevideo 1. Journal of Clinical Microbiology: publishes research on microbiological diagnosis, epidemiology, and treatment. 2. Clinical Microbiology Reviews: Provides comprehensive reviews on various topics in clinical microbiology. 3. Microbes and Infection: Focuses on the relationship between microorganisms and human and animal diseases. 4. Infection and Immunity: Covers research on interactions between pathogens and host defense systems. Reference Books: 1. "Principles of Virology" by S. Jane Flint, Vincent R. Racaniello, Glenn F. Rall, Anna Marie Skalka: An in-depth reference on viruses and their mechanisms of action. 2. "Mims' Medical Microbiology and Immunology" by Richard Goering, Hazel Dockrell, Mark Zuckerman, Peter L. Chiodini: 1. Centers for Disease Control and Prevention (CDC) – Microbiology: Provides information and updates on microbiological topics and infectious diseases. 2. World Health Organization (WHO) –

	Infectious Diseases: Provides reports and guidance on the prevention and control of infectious diseases. 3. PubMed: A database of medical publications and research. 4. ScienceDirect: A source for accessing scientific research and articles in various fields of science including microbiology.
Electronic References, Websites	© 2018 UpToDate. Lexicomp

Course Description Form

1.Course Name:	
Medical microbiology II	
2.Course Code:	
PH2202	
3.Semester / Year:	
second semester /second year	
4.Description Preparation Date:	
2025-2026	
5.Available Attendance Forms:	
Full-time and official attendance hours	
6.Number of Credit Hours (Total) / Number of Units (Total)	
3x15= 45 hrs (theoretical) 2x15=30 hrs (practical) /number of units = 4	
7.Course administrator's name (mention all, if more than one name)	
Name: Fatma Mostafa Kamel Email: Fatima.Mustafa@alayen.edu.iq	
8.Course Objectives	
Course Objectives	Studying the methods of parasites, especially those that cause epidemic diseases, and limiting their spread. In addition, studying the internal structure of pathogens and their characteristics, classifying them according to their component genome, as well as studying the factors affecting them, whether physical or chemical, and the extensive study of parasitic diseases, and using the best effective drugs according to the location of the effect of the pathogen's life cycle, how to control and prevent the spread of diseases, and following the best ways to control the sources of pollution resulting from the presence of these pathogens in the resources

used by humans as sources of food and drink.

9. Teaching and Learning Strategies

Strategy	• PowerPoint and Multimedia presentation • Class discussion. • Visual aids: Utilize visual aids such as pictures, charts, graphs, diagrams
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11. Course Structure

Course Structure (Theory)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1	The student will know general information about paracytology	Introduction	smartboard/ Presentation slides/ discussion	oral questions and written exams
2	4	The student will learn the morphology, life cycle, and diseases caused by intestinal protozoa.	Intestinal and tissue protozoa (Amoeba (pathogenic and non pathogenic), Balantidium, Giardia, Trichomonas Chilomastix)	smartboard/ Presentation slides/ discussion	oral questions and written exams
3	4	The student will be able to describe blood protozoa and the diseases they cause.	Haemoflagellates: Leishmania spp.; Trypanosome spp	smartboard/ Presentation slides/ discussion	oral questions and written exams

4	3	The student will learn the life cycle and clinical features of malarial parasites and Toxoplasma.	Sporozoa: Malarial parasites of human; Toxoplasma	smartboard/ Presentation slides/ discussion	oral questions and written exams
5	8	The student will be able to classify helminths and explain their life cycles and diseases.	Helminthes: Classification, Cestodes (Hymenolepis nana, Taenia spp.), Echinococcus (Hydatid cyst). Hepatic flukes, Trematodes (Blood Flukes: Schistosoma spp). Nematods: Ascaris, Entrobilus. Trichuris, Ancylostoma, Necator americans	smartboard/ Presentation slides/ discussion	oral questions and written exams
6	5	The student will understand viral structure, replication, and differences between viruses and bacteria.	Virology: Introduction, Comparison between viruses and Bacteria and other microbes; origin of viruses, reproduction, one step growth curve, type of mutations	smartboard/ Presentation slides/ discussion	oral questions and written exams
7	5	The student will be able to classify viruses and	Classification of viruses; RNA	smartboard/ Presentation	oral questions

		recognize important RNA and DNA viruses.	viruses: Orthomyxo viruses; Paramyxo viruses; Retro viruses; Hepato viruses; Oncogenic viruses. DNA viruses: Herpes viridae; poxviradeae, adenoviredeae, parvoviruses	slides/ discussion	and written exams
8	10	The student will learn innate and adaptive immunity, hypersensitivity, and tumor immunity.	Immunology: introduction, innate and adaptive immunity, complement, MHC molecule and autoimmune diseases, hypersensitivity, tumor immunity	smartboard/ Presentation slides/ discussion	oral questions and written exams
9	5	The student will be able to explain immunodeficiency disorders and laboratory immunological techniques.	Immunodeficiency, and immunological methods	smartboard/ Presentation slides/ discussion	oral questions and written exams

12.Course Evaluation

Midterm Exam 15 marks

Quizzes and activities 5 marks

Practical 20 marks

Final Exam 60 marks

13.Learning and Teaching Resources

Required textbooks (curricular books,

if any)	
Main references (sources)	1– Medical Microbiology, twentyeighth edition E.Jawetz, J.L. Melnick, E.A. Adel 2019 2– Medical Virology Thirteen edition By Phillip Rose 2012 3– HumanParasitology, 4th edition, Burton J. BOGITSH, Clint E. Carter, Thomas N. Oeltmann. 2013
Recommended books and references (scientific journals, reports...)	1. Barbara G.Wells & Joseph T. Diriro, Pharmacotherapy handbook 11th Edittion. 2–Chisholm–Burns, Marie A., Patrick M. Malone, Terry L. Schwinghammer, Jill M. Kolesar, Barbara G. Wells, and Joseph T. DiPiro. Pharmacotherapy principles & practice. 6th edition. 3. Pharmacotherapy casebook: a patient focused approach, McGraw Hill. 4–Roger Walker, Clive Edwards (eds), Clinical Pharmacy Therapeutics 6th &edition.
Electronic References, Websites	Journal of Clinical pharmacy and therapeutics International journal of clinical pharmacy

Course Description Form

1. Course Name:	
organic Chemistry II	
2. Course Code:	
PH2101	
3. Semester / Year:	
First semester / Second level	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3x15= 45 hrs (theoretical) 2x15=30 hrs (practical) /number of units = 4	
7. Course administrator's name (mention all, if more than one name)	
Name: Ranza Ahmed Abdo Hassan Email: Ranza.ahmed@alayen.edu.iq	
8. Course Objectives	
Course Objectives	- Understand the structure and stability of benzene and other aromatic compounds - Studying the basics of organic chemistry for some chemical groups that are considered the foundations of the study of pharmacy and to introduce students to the foundations of organic chemistry by focusing on predict and explain patterns in shape, structure, nomenclature system, bonding, hybridization, formal charge, stability, acidity, basicity, solubility, and reactivity for :benzene and its derivatives, aldehydes, ketones, carboxylic acids and their derivatives, amines and their derivatives , phenols
9. Teaching and Learning Strategies	
Strategy	1-lectures included multimedia lectures 2- power point presentation 3- practical work 4- open discussion

		5– class activity 6–Self learning			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	–Understand the structure and stability of benzene and other aromatic compounds. –Explain the mechanism of electrophilic aromatic substitution reactions. –Identify and describe the properties and reactions of arenes and their derivatives.	Introduction Aromatic Hydrocarbons (includes benzene, electrophilic aromatic substitution, arenes and their derivatives).	1–lectures included multimedia lectures 2– power point presentation 3– open discussion 5– class activity 6–Self learning	1–written exam
2.	9				2– Quiz
3.					3–midterm exam
4					4– final exam
5.	6	–Describe the physical and chemical properties of carboxylic acids. –Understand the acidity of carboxylic acids and factors affecting it. –Explain the common reactions	Carboxylic acids: properties and reactions.		
6					

		of carboxylic acids, including esterification and reduction.			
7	6	Identify and describe the structure and properties of esters, amides, anhydrides, and acyl chlorides. Understand the synthesis and reactions of these derivatives	Functional derivatives of carboxylic acids.		
8					
9	6	Classify amines and understand amine's structure and nomenclature. Describe the basicity of amines and factors affecting it. Explain the synthesis and reactions of amines, including their role in organic synthesis.	Amines I and II.		
10					

11	9	–Understand the structure, nomenclature, and properties of aldehydes and ketones.	Aldehydes and ketones (include also aldol and Claisen condensation); Classification, reactions and properties.		
12		–Explain the mechanisms of key reactions such as nucleophilic addition, aldol condensation.			
13		–Describe the synthesis and applications of aldehydes and ketones in organic chemistry.			
14	6	Describe the structure, properties, and acidity of phenols. Understand the reactions of phenols, including electrophilic substitution and oxidation.	Phenols		
15					

11. Course Evaluation

Written exam 60 marks

Midterm 10 marks

Practical exam 10 marks

Collective Theo practical exam 10 marks

Course work 10 marks

Total =100 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	ORGANIC CHEMISTRY BY Subrata Sen Gupta
Main references (sources)	ORGANIC CHEMISTRY BY SMITH – McGraw Hill – Copyright: 2023
Recommended books and references (scientific journals, reports...)	Scientific journals in basic specializations
Electronic References, Websites	Websites of Arab and foreign universities and pharmaceutical companies

Course Description Form

1. Course Name:	
organic Chemistry III	
2. Course Code:	
PH 2201	
3. Semester / Year:	
First semester / Second level	
4. Description Preparation Date:	
2025–2026	
5. Available Attendance Forms:	
Full–time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2x15= 30 hrs (theoretical) 2x15=30 hrs (practical) /number of units = 3	
7. Course administrator's name (mention all, if more than one name)	
Name: Ranza Ahmed Abdo Hassan Email: Ranza.ahmed@alayen.edu.iq	
8. Course Objectives	
Course Objectives	1. Studying the fundamental principles of heterocyclic chemistry, focusing on nitrogen–, sulfur–, and oxygen–containing rings that form the basis of pharmaceutical studies, such as pyrrole, furan, thiophene, pyridine, quinoline, and isoquinoline, including their properties, nomenclature, reactions, and methods of preparation. 2. Studying the methods used for the qualitative identification of various heterocyclic compounds, including pharmaceuticals and organic compounds. 3. Studying the significance of heterocyclic compounds, which have numerous applications in pharmaceutical chemistry and play essential roles in biochemical functions. Many heterocyclic compounds are widely used in medicine for the treatment of various diseases and injuries.
9. Teaching and Learning Strategies	

Strategy		1–lectures included multimedia lectures 2– power point presentation 3– practical work 4– open discussion 5– class activity 6–Self learning			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	–Understand the classification of heterocyclic systems. –Describe the general structures and properties of heterocyclic compounds. –Identify the occurrence of heterocyclic compounds in nature and medicinal products.	Introduction	1–lectures included multimedia lectures 2– power point presentation 3– open discussion 5– class activity 6–Self learning	1–written exam 2– Quiz 3–midterm exam 4– final exam
2	4		Heterocyclic		
3			system: Classes of heterocyclic systems; general structures; properties; Occurrence in nature and in medicinal products.		
4	2	Study the structure and properties of pyrrole, furan, and thiophene.	Five–membered ring heterocyclic compounds: pyrrole; furan and thiophen.		
5	2	Understand the natural sources of pyrrole, furan and thiophene.	Source of pyrrole, furan and thiophen.		

6	4	Explain the mechanisms of electrophilic substitution in pyrrole, furan, and thiophene, focusing on their reactivity and orientation.	Electrophilic substitution in pyrrole, furan and thiophen: Reactivity and orientation.				
7							
8	4	Describe the structure and reactions of pyridine. Understand the properties and applications of pyridine in organic synthesis.	Six-membered ring heterocyclic compounds: Structure & reactions of pyridine.				
9							
10	6	Study the structure, properties, and reactions of saturated five-membered heterocyclic compounds.	Saturated five-membered heterocyclic compounds.				
11							
12							
13	6	-Understand the structure and properties of five- and six-membered heterocyclic compounds containing two or three heteroatoms.	Heterocyclic of five & six member rings with two & three heteroatoms.				
14							
15							

		-Explain the synthesis and reactions of these compounds.			
11. Course Evaluation					
Written exam 60 marks Midterm 10 marks Practical exam 10 marks Collective Theo practical exam 10 marks Course work 10 marks Total =100 marks					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			ORGANIC CHEMISTRY BY Subrata Sen Gupta		
Main references (sources)			ORGANIC CHEMISTRY BY SMITH – McGraw Hill – Copyright: 2023		
Recommended books and references (scientific journals, reports...)			Scientific journals in basic specializations		
Electronic References, Websites			Websites of Arab and foreign universities and pharmaceutical companies		

Course Description Form

1. Course Name:	
Pharmacognosy I	
2. Course Code:	
PH2210	
3. Semester / Year:	
Second year / Second semester	
4. Description Preparation Date:	
2026-2025	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 hours/week (theoretical), 2 hours/week (practical), total units = 4	
7. Course administrator's name (mention all, if more than one name)	
Name: Hussein hamed hayal Email: hussain.hamed@alayen.edu.iq	
8. Course Objectives	
Course Objectives	1- Understanding the scientific foundations and basic concepts of botany and plant application to pharmaceutical compounds. 2- Explaining the importance of studying the phytochemical reactions of chemical compounds in designing and developing drugs. 3- Introducing students to biological functional groups and analyzing their impact on the biological activity of drugs. 4- Providing students with the knowledge necessary to understand the Extraction methods.
9. Teaching and Learning Strategies	
Strategy	1-lectures included multimedia lectures 2- power point presentation 3- practical work 4- open discussion 5- class activity 6-Self learning

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	1. Define Pharmacognosy and describe its scope in pharmacy. 2. Explain the importance of Pharmacognosy in drug discovery and quality control. 3. Identify natural sources of drugs (plant, animal, mineral, microbial). 4. Describe the principles of classification of crude drugs. 5. Classify crude drugs based on source, morphology, chemical constituents, and pharmacological action.	General introduction and classification	1-lectures included multimedia lectures 2- power point presentation 3- open discussion 5- class activity 6-Self learning	1-written exam 2- Quiz 3-midterm exam 4- final exam
2	3	1. Classify natural products into reserved food materials and by-products. 2. Identify reserved food materials (starch, mucilage, proteins, fixed oils, fats, and waxes) and state their pharmaceutical importance. 3. Recognize plant by-products and differentiate calcium oxalate from calcium carbonate in crude drug identification.	The Natural Products a-Reserved Food Materials 1- Starch 2- Mucilage 3- Protein 4- Fixed oil, Fats and Wax b- By-Products 5- Calcium oxalate Calcium carbonate		
3	3	1. Classify active constituents of crude drugs. 2. Identify major classes (alkaloids, volatile oils, glycosides, tannins, resins, gums, oleo-gums, oleo-gum-resins,	c-Active Constituents 1- Alkaloids, Volatile oils,		

		balsams, bitter principles) and their general significance	Glycosides, Tannins, Resins, Gum, Oleo-gum, Oleo-gum-resin, Balsams, Bitter principles		
4	3	1. Describe the main steps in crude drug production: collection, preparation and curing, drying, and storage. 2. Explain adulteration of crude drugs and identify basic methods for its detection	The production of crude drugs: 1- Collection 2- Preparing and curing of drugs 3- Drying 4- Storage Adulteration of drugs and methods for detection		
5	3	1. Describe the basic morphology and anatomy of leaves relevant to crude drug identification. 2. Identify and differentiate Squill and Peppermint leaves based on their key morphological and anatomical features.	1- Introduction (morphology and anatomy of leaves) <i>Squill, Peppermint</i>		
6	3	1. Identify Egyptian Stramonium as a leaf crude drug of pharmacognostic importance. 2. Recognize key morphological and anatomical characters used in its identification. 3. Relate Stramonium to its active constituents and pharmaceutical significance.	Stramonium, Egyptian and		
7	3	1. Identify Senna and Buchu leaves as important crude drugs.	Senna, Buchu,		

		2. Describe key morphological and anatomical features for their identification. 3. Relate each leaf to its active constituents and pharmaceutical use.			
8	3	1. Identify the listed leaves as important crude drugs in Pharmacognosy. 2. Describe key morphological and anatomical features for each leaf. 3. Relate each leaf to its active constituents and pharmaceutical applications	Tea, Coca, Hamamelis, Jaborandi, Uva-ursi, , Henna		
9	3	1. Identify Boldo and Eucalyptus leaves as important crude drugs. 2. Describe their key morphological and anatomical features for proper identification. 3. Relate each leaf to its active constituents and therapeutic applications	Boldo, Eucalyptus,		
10	3	1. Identify Rosemary and Sweet Basil leaves as crude drugs. 2. Describe key morphological and anatomical features for identification. 3. Relate each leaf to its active constituents and pharmaceutical uses.	Rosemary, Sw basil		
11	3	1. Identify Peppermint leaves as a crude drug. 2. Describe key morphological and anatomical features for identification. 3. Relate Peppermint to its active constituents and pharmaceutical uses.	, Peppermint,		
12	3	1. Identify Sweet Marjoram leaves as a crude drug. 2. Describe key morphological and anatomical features for proper identification. 3. Relate Sweet Marjoram to its active constituents and pharmaceutical uses	Sweet marjoram		

13	3	1. Identify Digitalis and Squill as important crude drugs. 2. Describe key morphological and anatomical features for identification. 3. Relate each drug to its active constituents and therapeutic uses.	Digitalis, Squill		
14	3	1. Identify European Henbane as a crude drug. 2. Describe key morphological and anatomical features for identification. 3. Relate European Henbane to its active constituents and therapeutic uses	European henbane		
15	3	1. Identify Belladonna as a crude drug. 2. Describe key morphological and anatomical features for proper identification. 3. Relate Belladonna to its active constituents and therapeutic uses	Belladonna		

11. Course Evaluation

Written exam 60 marks

Midterm 15 marks

Practical 25 marks

Total = 100 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)

Essential Books (Text Books)

1–Trease, G.E. and Evans, W.C. “Trease and Evans’ Pharmacognosy” WB Saunders Co. Ltd., London, Philadelphia, Toronto, Sydney, Tokyo (1994, 2005).

2– Wallis, T.A. “Textbook in Pharmacognosy” CBS publisher & Distributers, First Indian edition (1985).

3– Mahran, G.H., “Medicinal Plants” 1st Ed.(1967).

4–Saber, A.H., “Practical Pharmacognosy” El-Shaab Printing House, 4th Ed. (1966).

	5-Jackson, B.P. and Snowdon D.W., "Atlas of microscopy of medicinal plants, herbs and spices" Belhaven Press, Printer Publishers, London. (1990).
Main references (sources)	1-Indian Pharmacopoeia, Egyptian Pharmacopoeia. 2-De Smet, P.A., Keller, K., Hausel, R. and Chandler, R.F., "Adverse effects of herbal drugs", Springer Verlag, Berlin, Heidelberg, New York, London, Paris, Tokyo, Hong Kong, Vol. I (1993). 3-Weiss R.F. and Fintelmann V. "Herbal Medicine", Thieme, Stuttgart, New York, 2nd Ed. (2000).
Recommended books and references (scientific journals, reports...)	Scientific journals in basic specializations
Electronic References, Websites	Websites of Arab and foreign universities and pharmaceutical companies

Course Description Form

1. Course Name:	
Physical pharmacy 1	
2. Course Code:	
PH2103	
3. Semester / Year:	
First semester/2 nd year	
4. Description Preparation Date:	
2026–2025	
5. Available Attendance Forms:	
Full–time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 hours/week (theoretical), 2 hours/week (practical), total units = 4	
7. Course administrator's name (mention all, if more than one name)	
Name: Lecturer Dr. Ahmed Hassan Email: ahmed.hassan@alayen.edu.iq	
8. Course Objectives	
Course Objectives	1) Understand the states of matter, molecular interactions, and phase equilibria, including the phase rule and thermal analysis techniques. 2) Analyze the properties of non–electrolyte solutions, including colligative behavior and methods for molecular weight determination. 3) Study the behavior of electrolyte solutions, applying theories of dissociation, ionic strength, and colligative property expressions. 4) Explore solubility and distribution phenomena, focusing on solute–solvent interactions and partitioning between immiscible phases. 5) Apply principles of ionic equilibria, acid–base theories, pH calculations, and the effect of ionic strength on solution behavior. 6) Understand the formulation and function of buffered and isotonic solutions in maintaining pH and physiological compatibility
9. Teaching and Learning Strategies	

Strategy	1– Lectures and presentation 2– Class discussion 3– Laboratory experiments				
10. Expected learning outcomes					
Weeks	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Develop an understanding of the various binding forces and assess their relevance to different molecular systems.	Stats of matter: Binding forces between molecules. the gaseous state	– Lectures –White board –Data show –Power point –Explanatory diagrams –laboratory experiments	oral questions and written exams Laboratory reports
2	3	An understanding of the properties of matter in the gaseous and liquid states	Stats of matter: Liquid and solid state		
3	3	Explain the characteristics of the solid state, including crystallinity, solvates, and polymorphism, and understand phase equilibria and transitions between solid, liquid, and gaseous states.	Stats of matter: The liquid crystalline state The supercritical fluid state Phase equilibria and phase rule		

4-5	6	Develop an understanding of the properties of nonelectrolyte solutions and distinguish between ideal and real solutions based on Raoult's law. Recognize and describe the four colligative properties exhibited by nonelectrolytes in solution.	Nonelectrolytes: Physical properties of substances Types of solutions Concentration expressions		
6-7	6	Develop an understanding of electrolyte solutions and analyze the similarities and differences in colligative behavior between electrolytic and nonelectrolytic solutions.	Electrolytes solution		
8	3	–Understand Solvent-solute interactions, Factors affecting solubility – Classification of solvents & their mechanism of action	Solubility and distribution phenomena,		

9–10	6	–Explain the factors that affect the solubility of liquids and the ideal solubility of solids, as well as the variables influencing the solubility behavior of various solid substances. –Poor aqueous solubility and Measuring solubility	Solubility: Solubility of liquid in liquid and solid in liquid		
11	3	Understand the phenomena of extraction and preservation	Distribution of solutes between immiscible solvents		
12–13	6	Explain the Brønsted–Lowry and Lewis electronic theories, and recognize and define the four types of solvents. Acid–base equilibria Calculation of pH and acidity constants	Ionic equilibria, modern theories of acids and bases, acid–base equilibria,		
14–15	6	–Apply the buffer equation as the Henderson–Hasselbalch equation, for a weak acid or base and its salt – Determination of buffer capacity	Buffered solutions		

		- Buffers in pharmaceutical and biological systems			
11. Course Evaluation					
Mid term Exam 15 marks					
Quizzes and activities 5 marks					
Practical 20 marks					
Final Exam 60 marks					
12. Learning and Teaching Resources					
13.Required textbooks (curricular books, if any)		1–Martin’s physical pharmacy and pharmaceutical sciences, Patrick J. Sinko . Wolters Kluwer. Lippincott Williams &Wilkins. Philadelphia. 2011. 2–Lab manual for physical pharmacy adopted by the department			
Main references (sources)		Pharmaceutical Dosage forms and drug delivery Edited By Ram I. Mahato, Ajit S. Narang by Taylor & Francis Group, LLC Third Edition			
Recommended books and references (scientific journals, reports...)					
Electronic References, Websites					

Course Description Form

1. Course Name:	
Physical pharmacy II	
2. Course Code:	
PH2203	
3. Semester / Year:	
Second semester/2 nd year	
4. Description Preparation Date:	
2026–2025	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 hours/week (theoretical), 2 hours/week (practical), total units = 4	
7. Course administrator's name (mention all, if more than one name)	
Name: Lecturer Dr. Ahmed Hassan Ibrahim Email: Ahmed.Hassan@alayen.edu.iq	
8. Course Objectives	
Course Objective:	1) Understand complexation phenomena, classification of complexes, and methods used for their analysis. 2) Explore the principles of drug diffusion, including Fick's laws, diffusion through membranes, and factors affecting permeability. 3) Analyze chemical kinetics of drug degradation and perform stability studies using reaction rate laws and accelerated testing. 4) Study interfacial phenomena, surface tension, spreading, and the role of surfactants in wetting and formulation stability. 5) Examine the rheological properties of pharmaceutical systems, including thixotropy and methods of flow characterization.

	6) Learn about colloidal systems, micromeritics, and polymer science with focus on particle behavior, formulation impact, and pharmaceutical applications.				
9. Teaching and Learning Strategies					
Strategy	1– Lectures 2– Class discussion 3– Quizzes 4–Reports				
10. Course Structure (Theory)					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Develop a comprehensive understanding of complexation phenomena, the classification of complexes, and the analytical approaches used for their evaluation.	Complexation	– Lectures –White board –Data show –Power point –Explanatory diagrams –laboratory experiments	Written exams – Oral exams –Laboratory reports
2	3	–Understand the analytical approaches used for the complexation evaluation. –Explore the principles of drug diffusion	Complexation Diffusion		
3	3	Understand Fick’s laws, diffusion through membranes,	Diffusion		
4	3	–understand factors affecting permeability – Understand the reaction rate, reaction order, and molecularity	Diffusion chemical kinetics and stability		
5–6	6	Understand the concept of stability and expiration date of a medicament	chemical kinetics and stability		

7	3	Understand classification of interfaces, liquid interfaces, surface and interfacial tensions, surface free energy, measurement of interfacial tension, spreading coefficient adsorption at liquid interfaces surface active agents, systems of Hydrophile–Lipophile classification and adsorption at solid interfaces	Interfacial Phenomena		
8	3	–Understand the solid gas interface, the solid liquid interface, wetting and wetting agents, applications of surface–active agents, foam and antifoaming agents And electric properties of interfaces – Understand Newtonian systems and Non–Newtonian systems ⁹	Interfacial Phenomena Rheology		
9	3	Examine the rheological properties of pharmaceutical systems including thixotropy and methods of flow characterization.	Rheology		
10	3	–Understand Viscoelasticity Pharmaceutical areas in which rheology is Significant –understand disperse systems and Types of colloidal systems	Rheology Colloids		

11	3	Understand Optical properties of colloids kinetic properties of colloids and electrical properties of colloids	Colloids		
12	3	–Understand solubilization using colloids Pharmaceutical applications of colloids – Understand Particle size and size distribution and Methods of determining particle size and Particle shape and surface area	Colloid Micrometrics		
13–14	6	–Understand methods for determining surface area Derived properties of powders (porosity, packing arrangements, densities of particles, bulkiness and flow properties) –Understand Copolymers and polymer blends and thermoplastic and thermoset polymers	Micrometrics Pharmaceutical polymer		
15	3	Understand polymer properties (crystalline and amorphous polymers, thermal transitions, glass transition temperature, plasticized polymers, molecular weight, mechanical properties, Polymers for pharmaceutical applications Polymers in drug delivery	Pharmaceutical polymer		

11. Course Evaluation

Midterm Exam 15 marks

Quizzes and activities 5 marks

Practical 20 marks

Final Exam 60 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1–Martin’s physical pharmacy and pharmaceutical sciences, Patrick J. Sinko . Wolters Kluwer. 2–Lab manual for physical pharmacy adopted the department
Main references (sources)	Aulton's Pharmaceutics: The Design and Manufacture of Medicines, Third Edition, Michael E. Aulton (Author) Churchill, Livingstone–Elsevier
Recommended books and references (scientific journals, reports...)	Pharmaceutical Dosage forms and drug delivery Edited By Ram I. Mahato, Ajit S. Narang by Taylor & Francis Group, LLC Third Edition
Electronic References, Websites	

Course Description Form

1. Course Name:	
Physiology I	
2. Course Code:	
PH2104	
3. Semester / Year:	
1 st semester/ 2 nd year	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 hours/week (theoretical), 2 hours/week (practical), total units = 4	
7. Course administrator's name (mention all, if more than one name)	
Name: Karema mohamed Abuelfotouh soliman Email: Karema.mohammed@alayer.edu.eg	
8. Course Objectives	
Course Objectives	Course Objectives for Physiology The Physiology course aims to provide students with a comprehensive understanding of the functions and mechanisms of the human body. By the end of this course, students should be able to: 1- Understand Fundamental Concepts: - a- Explain the physiological principles underlying the functioning of different organ systems. - b- Describe the homeostatic mechanisms that maintain internal balance within the body. 2- Analyze Organ System Interactions

	a– Demonstrate knowledge of the interdependence and integration organ systems.
9. Teaching and Learning Strategies	
Strategy	1 –Interactive Lectures Deliver core concepts with clear explanations using slides, diagrams, and flowcharts. Encourage student participation through questions and short quizzes to reinforce understanding. 2. Problem–Based Learning (PBL) Present clinical or physiological scenarios and have students work in small groups to solve problems. Develop critical thinking and apply theoretical knowledge to practical situations. 3. Laboratory Practicals Conduct experiments to demonstrate physiological mechanisms (e.g., muscle contraction, nerve conduction, cardiovascular responses). Teach students hands–on skills, observation, and data recording for accurate analysis. 4. Demonstrations and Visual Aids Use models, charts, and videos to illustrate complex processes like respiration, renal function, and neurophysiology. Enhance understanding of dynamic physiological processes. 5. Case Studies and Clinical Correlations Integrate real–life clinical scenarios with theoretical concepts (e.g., hypertension, diabetes). Help students connect physiology with pharmacy practice and patient care. 6. Small Group Discussions Encourage collaborative learning and discussion of key physiological mechanisms. Foster peer–to–peer learning and problem–solving skills.

7. Concept Mapping

Use concept maps to link physiological processes, organ systems, and regulatory mechanisms.

Improve comprehension and memory retention of complex topics.

8. Quizzes and Formative Assessments

Conduct short quizzes and interactive polls during lectures.

Provide immediate feedback to reinforce learning and identify weak areas.

9. Simulation and Virtual Labs

Use computer-based simulations for cardiovascular, respiratory, and renal physiology.

Allow students to manipulate variables safely and understand cause-effect relationships.

10. Self-Directed Learning

Assign pre-readings, online modules, or video lectures before class.

Encourage students to research, summarize, and present key physiological concepts.

11. Peer Teaching

Assign students to explain a concept or physiological pathway to their classmates.

Reinforce knowledge through teaching and improve communication skills.

12. Flipped Classroom Approach

Provide lecture material online and use classroom time for active problem-solving and discussion.

Encourage active learning and better application of theoretical knowledge.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Describe the structural components of the cell Explain functions of major organelles	Information about the cell composition	smartboard Presentation slides/ discussion	oral questions and written exams
2	3	Describe the structure of the cell membrane Explain membrane transport mechanisms	Body cells and cell membrane, ion channels	smartboard Presentation slides/ discussion	oral questions and written exams
3	3	Describe the structure and properties of mixed nerves Identify types and functions of glial cells	Properties of mixed nerves, glia, neurotrophins	smartboard Presentation slides/ discussion	oral questions and written exams
4	3	Describe phases of the action potential Explain factors affecting nerve impulse conduction	Nerve functions graded potential action potential	smartboard Presentation slides/ discussion	oral questions and written exams
5	3	Compare smooth and cardiac muscle structure Explain mechanisms of contraction in each muscle type	Smooth muscle cardiac muscle	smartboard Presentation slides/ discussion	oral questions and written exams
6	3	Interpret basic EEG patterns	Alert behavior, sleep and electrical activity	smartboard Presentation slides/	oral questions

		Explain neural control of posture and movement	of the brain, control of posture and movement	discussion	and written exams
7	3	Describe organization of the autonomic nervous system Differentiate between sympathetic and parasympathetic systems	Autonomic nervous system	smartboard Presentation slides/ discussion	oral questions and written exams
8	3	Describe the role of pulmonary surfactant Explain regional differences in ventilation and blood flow	Surfactants, differences in ventilation and blood flow in different parts of the lung	smartboard Presentation slides/ discussion	oral questions and written exams
9	3	Describe oxygen transport in blood Explain hemoglobin-oxygen dissociation curve	Gas transport between the lung and tissue	smartboard Presentation slides/ discussion	oral questions and written exams
10	3	Explain respiratory responses to exercise Define hypoxia and its types	Respiratory adjustment in health and disease, hypoxia, emphysema, asthma	smartboard Presentation slides/ discussion	oral questions and written exams
11	3	Identify factors affecting GFR Explain clinical significance of GFR changes	Glomerular filtration rate: measurements, factors affecting GFR	smartboard Presentation Slides /discussion	oral questions and written exams

12	3	Explain the countercurrent multiplier mechanism Describe the role of urea in urine concentration	The counter current mechanism, role of urea, water diuresis and osmotic diuresis	smartboard Presentation slides/ discussion	oral questions and written exams
13	3	Define uremia and metabolic acidosis Explain neural control of micturition	Bicarbonate excretion, regulation of Na, K and CL excretion, uremia, acidosis, micturition	smartboard Presentation Slides /discussion	oral questions and written exams
14	3	Describe the components of a normal ECG Explain electrical activity of the heart	The electrocardiogram, cardiac arrhythmias	smartboard Presentation slides/ discussion	oral questions and written exams
15	3	Define cardiac output Explain factors affecting cardiac output	Cardiac output	smartboard Presentation slides/ discussion	oral questions and written exams

11. Course Evaluation

Midterm Exam 15 marks

Quizzes and activities 5 marks

Practical 20 marks

Final Exam 60 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)

Main references (sources)	Guyton and Hall Textbook of Medical Physiology Ganong's Review of Medical Physiology
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Pharmacy ethics	
2. Course Code:	
PH3206	
3. Semester / Year:	
Second semester/ Third level	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
15h / 1 unit	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Fahmi Yahya Ahmed Email: Fahmi.yahya@alayen.edu.iq	
8. Course Objectives	
Course Objectives	1. Enabling the student to understand the basic concepts of ethics, which formulate the pharmacist's relationship with the patient, colleagues, and other health workers in order to provide his pharmaceutical services in a good manner. 2. To enable the student to explain the ethical principles of autonomy, non-maleficence, beneficence, justice, fidelity, confidentiality, honesty and accountability as they relate to the practice of pharmacy. 3. To enable the student to understand the importance of each ethical principle in guiding professional behavior and decision-making in pharmacy settings. 4. To enable the student to identify real-world scenarios where these ethical principles can come into play and apply them appropriately to resolve ethical dilemmas in pharmacy practice. 5. To enable the student to demonstrate ethical thinking skills by analyzing case studies and formulating ethical solutions that support the principles of autonomy, non-maleficence, benevolence, justice, sincerity, confidentiality, honesty and accountability in the context of pharmacy practice.
9. Teaching and Learning Strategies	
Strategy	1- Whiteboard, multimedia lectures, power point presentation 2- Class discussion 3- Presentation of cases of ethical dilemmas 4- Handouts 5- Brainstorming 6- Problem solving
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1	This lecture aims to enable students to understand the historical background and fundamental concepts of ethics in pharmacy practice and recognize the importance of ethical principles in professional decision-making.	Introduction to Pharmacy Ethics (Theoretical considerations).	1- Whiteboard, multimedia lectures, power point presentation 2- Class discussion 3- Presentation of cases of ethical dilemmas 4- Handouts 5- Brainstorming 6- Problem solving	1- Short MCQs 2- Oral exam and direct questions in the class 3- Midterm exam 4- Electronic exams on the electronic platform 5- Final exam 6. Reports and Assignments
2	1	This lecture focuses on developing students' understanding of the principles and standards outlined in the professional code of ethics and their application in daily pharmacy practice.	Code of Ethics for Pharmacists		
3/4/5	3	This lecture aims to familiarize students with core ethical principles such as beneficence, autonomy, honesty, informed consent, confidentiality, and fidelity, and their relevance to pharmaceutical care practice.	Common Ethical Considerations in Pharmaceutical Care Practice (Beneficence, Autonomy, Honesty, Informed Consent, Confidentiality, Fidelity).		
6/7	2	This lecture aims to develop students' ability to build and maintain ethical and respectful interprofessional relationships to support collaborative patient care.	Interprofessional Relations.		
8	1	This lecture focuses on enhancing students' skills in ethical decision-making by applying structured approaches to resolve	Making ethical decisions		

		ethical dilemmas in pharmacy practice.			
9	1	This lecture aims to enable students to understand the role of ethics in clinical research, including ethical responsibilities before and during the conduct of research involving human subjects.	Ethical issues related to clinical pharmacy research.		
10	1	This lecture aims to enable students to understand the role of ethics in clinical research, including ethical responsibilities before and during the conduct of research involving human subjects.	Ethical problems in pharmacist's clinical practice.		
11	1	This lecture prepares students to recognize medication misuse and abuse, understand their consequences, and apply ethical principles in prevention and management strategies.	Preventing misuse of medicines.		
12/13/ 14/15	4	This lecture aims to strengthen students' ability to apply ethical principles to real clinical scenarios and analyze ethical dilemmas encountered in pharmacy practice.	Case studies in pharmacy ethics.		

11. Course Evaluation

20% Midterm exam, 10% (Quizzes, attendance, active participation in class, assignment), 70% final

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1-Robert J. Cipolle, Linda M. Strand, Peter C. Morley. Pharmaceutical Care Practice: The Clinician's Guide, 3rd Edition. 2- Robert m. Veatch and Amy Haddad. C Studies in Pharmacy Ethics.
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	Third edition. Copyright © 2008 by Oxford University Press, Inc
Main references (sources)	1-Robert J. Cipolle, Linda M. Strand, Peter C. Morley. Pharmaceutical Care Practice: The Clinician's Guide, 3rd Edition.
Recommended books and references (scientific journals, reports...)	1. Course Notes: Medical Law and Ethics. 2. Compelling Ethical Challenges in Critical Care and Emergency Medicine.
Electronic References, Websites	

Course Description Form

1. Course Name:	
Inorganic pharmaceutical chemistry	
2. Course Code:	
PH3101	
3. Semester / Year:	
First semester / third level	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2x15= 45 hrs. (theoretical) 2x15=30 hrs. (practical) /number of units = 4	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Mohamed Mohamed Shahin Email: MohamedShahin.pharm@gmail.com	
8. Course Objectives	
Course Objectives	- This course examines the clinical application of inorganic compounds, focusing on the relationship between chemical structure and therapeutic or diagnostic function. - Students will study the roles of key metals in medicine, including platinum anticancer agents and chelation therapy. - A significant component is dedicated to radiopharmacy, covering the principles, safe handling, and application of radiopharmaceuticals in advanced medical imaging and treatment.
9. Teaching and Learning Strategies	
Strategy	1-lectures included multimedia lectures 2- power point presentation 3- practical work

- 4– open discussion
- 5– class activity
- 6–Self learning
- 7– Quizzes and assignments

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	1. Identify the electron configurations of lithium, sodium, and potassium. 2. Describe the basic chemical properties of these metals. 3. Explain how lithium is used in medicine and its pros and cons. 4. Understand why sodium is important for the human body. 5. Describe how sodium ions move in and out of cells (active transport). 6. Discuss the effects of sodium in food, medicine, and health. 7. Recognize the role of potassium in the body and its medical uses.	Alkali Metals: Lithium, Sodium, Potassium: Electron configuration, chemical properties of metals, Advantages and disadvantages using lithium-based drugs, Sodium as an essential ion in the human body, Active transport of sodium ions, Drugs, diet and toxicity of sodium ions, Potassium and its clinical application.	1–lectures included multimedia lectures 2– power point presentation 3– open discussion 5– class activity 6–Self learning	1–written exam 2– Quiz 3–midterm exam 4– final exam
2	2	1. Identify the electron configurations of magnesium and calcium. 2. Describe the basic	Alkaline Earth Metals: Magnesium, Calcium: Electron configuration of metals, Major uses		

		chemical properties and common uses of these metals. 3. Explain the biological importance of magnesium in the human body. 4. List some clinical uses and pharmaceutical preparations of magnesium. 5. Understand the essential role of calcium in body functions like bones, muscles, and nerves.	and Chemical properties, Magnesium Biological importance and clinical applications and preparations. Calcium: the key to many human functions.		
3,4	4	1. Describe the general chemical properties of Group 13 elements. 2. Explain the pharmaceutical uses of boric acid and the drug bortezomib. 3. Understand the biological role of aluminum and its use in adjuvants and antacids. 4. List aluminum-based drugs used as phosphate binders and antiperspirants. 5. Introduce the element gallium, its chemistry, and its medical	Group 13: Aluminum, Boron and Gallium: General chemistry of group 13 elements, Pharmaceutical applications of boric acid, Bortezomib, Biological importance of Aluminium and its adjuvants, Antacids, Aluminum-based therapeutics, Phosphate binders, Antiperspirant. Gallium Introduction, Chemistry, Pharmacology of gallium-based drugs		

		applications. 6. Identify the pharmacological uses of gallium-based drugs in clinical settings.	and their uses		
5	2	1. Describe the general chemical properties of Group 14 elements. 2. Compare silicon-based drugs with carbon-based analogues in terms of structure and function. 3. Recognize common silicon-containing groups used in medicinal chemistry. 4. Understand the concept of silicon isosters and their role in drug design. 5. Identify examples and uses of organosilicon drugs in clinical practice.	The Carbon Group: General chemistry of group 14 elements, Silicon-based drugs versus carbon-based analogues, Introduction of silicon groups, Silicon isosters, Organosilicon drugs.		
6,7	4	1. Identify the electronic configurations of key d-block elements. 2. Describe the role of platinum compounds in cancer treatment. 3. Explain the biological importance and clinical uses of iron. 4. Recognize the medical	Transition Metals and d-Block Metal Chemistry: Electronic configurations, platinum anticancer agents, Iron and its role in biological systems, clinical applications. Copper-containing drugs,		

		applications of copper-containing drugs. 5. Discuss the potential of silver as an antimicrobial agent. 6. Understand how gold compounds are used to treat rheumatoid arthritis. 7. Describe the role of zinc in the body, its medical uses, and possible toxicity.	Silver: the future of antimicrobial agents?, Gold: the fight against rheumatoid arthritis and zinc and its role in biological systems, clinical applications and toxicity.		
8	2	1. Define what heavy-metal poisoning is and its common causes. 2. Explain the concept of chelation and how it works in the body. 3. Describe the purpose and process of chelation therapy. 4. Identify key chelating agents such as: –Calcium disodium edetate, Dimercaprol (BAL) and DMSA 5. Understand the clinical uses and differences between these chelating agents.	Chelation Therapy: What is heavy-metal poisoning? What is chelation? Chelation therapy, Calcium disodium edetate, Dimercaprol (BAL), Dimercaptosuccinic acid (DMSA), 2,3-Dimercapto-1-propanesulfonic acid (DMPS), and Lipoic acid (ALA).		
9	2	1. Define what protective adsorbents are and how	Protective adsorbents		

		they work. 2. Identify common examples of protective adsorbents used in medicine. 3. Explain how adsorbents protect the gastrointestinal tract from toxins and irritants. 4. Describe the clinical uses of substances like activated charcoal, kaolin, and attapulgite. 5. Understand the role of adsorbents in treating poisoning, diarrhea, and gastric discomfort.			
10	2	1. Define what topical agents are and how they are applied. 2. Identify different types of topical agents (e.g., antiseptics, emollients, corticosteroids). 3. Explain the general uses of topical agents in treating skin and mucosal conditions.	Topical agents		
11	2	1. Define what dental agents are and their general purpose. 2. Identify common types of dental agents (e.g.,	Dental agents		

		fluoride, antiseptics, desensitizing agents). 3. Explain how dental agents help in preventing and treating oral diseases. 4. Describe the role of fluoride in protecting teeth from decay. 5. Recognize the clinical uses of dental agents in oral hygiene and dental procedures.			
12	2	1. Define organometallic chemistry and explain what metallocenes are. 2. Describe the structure and properties of ferrocene and its medical potential. 3. Explain how ferrocene derivatives may be used to treat malaria and breast cancer. 4. Identify the role of titanocenes as titanium-based anticancer agents. 5. Describe the use of vanadocene dichloride and other vanadium-based drugs in cancer therapy. 6. Understand how some vanadium compounds act	Organometallic Chemistry: What is organometallic chemistry and metallocenes? Ferrocene derivatives as potential antimalarial agent and antibreast cancer, Titanocenes in titanium-based anticancer agents and Vanadocene dichloride as anticancer agents, Further vanadium-based drugs: insulin mimetics.		

		as insulin mimetics in diabetes research.			
13,14	4	1. Define radioactive compounds and their role in medicine. 2. Explain the basic principles of radiopharmacy and safe handling of radiopharmaceuticals. 3. Identify common therapeutic uses of radiopharmaceuticals (e.g., cancer treatment, thyroid disorders). 4. Describe the procedures for dispensing radioactive drugs safely. 5. Understand the importance of radiation protection for patients and healthcare workers.	Radioactive Compounds and Their Clinical Application, Radiopharmacy: dispensing and protection, Therapeutic use of radiopharmaceuticals.		
15	2	1. Define radiopharmaceuticals and their role in medical imaging. 2. Identify common imaging techniques that use radiopharmaceuticals (e.g., PET, SPECT). 3. Explain how radiopharmaceuticals help visualize organs and detect	Radiopharmaceuticals for imaging		

		diseases. 4. List examples of radiotracers used in diagnostic imaging (e.g., technetium-99m, fluorodeoxyglucose). 5. Understand the safety and handling considerations for imaging radiopharmaceuticals.			
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11. Course Evaluation

Written exam 60 marks
Midterm 15 marks
Practical exam 10 marks
Collective Theo practical exam 5 marks
Course work 10 marks
Total =100 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Inorganic Medicinal and Pharmaceutical Chemistry by Block, Roche Soine and Wilson, latest edition
Main references (sources)	Essentials of Inorganic Chemistry For Students of Pharmacy, Pharmaceutical Sciences and Medicinal Chemistry by KATJA A. STROHFELDT, School of Pharmacy, University of Reading, UK
Recommended books and references (scientific journals, reports...)	Inorganic chemical acta and Coordinat Chemistry Reviews
Electronic References, Websites	Inorganic Chemistry Research (Inorg. Chem. Res.)

Course Description Form

1. Course Name:	
Organic pharmaceutical chemistry I	
2. Course Code:	
PH3201	
3. Semester / Year:	
Second semester / third level	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3x15= 45 hrs (theoretical) 2x15=30 hrs (practical) /number of units = 4	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Ranza Ahmed Abdo Hassan Elrayess Email: Ranza.Ahmed@alayen.edu.iq	
8. Course Objectives	
Course Objectives	• This course aims to provide students with a comprehensive understanding of the principles governing drug distribution, acid-base properties, and drug-receptor interactions. • It focuses on the application of QSAR models, molecular modeling, and statistical methods to predict pharmacological activity and analyze structure-activity relationships. Additionally, the course covers drug metabolism pathways and the factors affecting them to support rational drug design and optimization.
9. Teaching and Learning Strategies	

Strategy		1–lectures included multimedia lectures 2– power point presentation 3– practical work 4– open discussion 5– class activity 6–Self learning			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Students will be able to explain the factors influencing drug distribution and their impact on drug efficacy and safety	Drug distribution.	1–lectures included multimedia lectures 2– power point presentation 3– open discussion 5– class activity 6–Self learning	1–written exam 2– Quiz 3–midterm exam 4– final exam
2.	3	Students will be able to analyze the acid–base properties of drugs and their role in drug absorption and distribution	Acid– base properties.		
3.	3	Students will be able to apply basic statistical methods to predict pharmacological activity of drug molecules.	Statistical prediction of pharmacological activity.		
4	3	students will be able to interpret and construct QSAR models to correlate	QSAR models.		

		chemical structure with biological activity			
5.	3	Students will be able to use molecular modeling techniques to support computer-aided drug design and optimization.	Molecular modeling (Computer aided drug design.)		
6	3	Students will be able to describe the types of forces involved in drug-receptor interactions.	Drug receptor interaction: force involved.		
7	3	students will be able to evaluate the effect of steric features on drug-receptor binding and biological activity.	Steric features of drugs.		
8	3	students will be able to assess the influence of optical isomerism and molecular conformation on biological activity	Optical isomerism and biological activity. Calculated conformation.		
9	3	Students will be able to apply 3D-QSAR techniques and utilize databases in drug design studies.	Three- dimensional quantitative structure activity relationships and databases.		

10	3	Students will be able to explain the concept of isosterism and its role in modifying drug–receptor interactions	Isosterism, Drug receptor interaction and subsequent		
11	3	Students will be able to describe the basic principles and phases of drug metabolism	Drug Metabolism–I		
12	3	students will be able to explain Phase I metabolic reactions and their effects on drug activity.	Drug Metabolism–II		
13	3	Students will be able to explain Phase II metabolic reactions and their role in drug elimination	Drug Metabolism–III		
14	3	Students will be able to analyze metabolic pathways and their clinical significance	Drug Metabolism–IV		
15	3	Students will be able to identify and discuss the biological and chemical factors affecting drug metabolism	Factor affecting on Drug Metabolism–		
11. Course Evaluation					
Written exam 60 marks					

Midterm 15 marks

Practical 25 marks

Total = 100 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Wilson and Gisvold Textbook of Organic medicinal and Pharmaceutical chemistry, Delgado JN, Remers WA, (Eds); 12th ed, 2011.
Main references (sources)	Wilson and Gisvold Textbook of Organic medicinal and Pharmaceutical chemistry, Delgado JN, Remers WA, (Eds); 12th ed, 2011.
Recommended books and references (scientific journals, reports...)	Scientific journals in basic specializations
Electronic References, Websites	Websites of Arab and foreign universities and pharmaceutical companies

Course Description Form

1.Course Name:	
Pathophysiology	
2.Course Code:	
PH3105	
3.Semester / Year:	
First semester /Third year	
4.Description Preparation Date:	
2025-2026	
5.Available Attendance Forms:	
Full-time and official attendance hours	
6.Number of Credit Hours (Total) / Number of Units (Total)	
3x15= 45 hrs (theoretical) 2x15=30 hrs (practical) /number of units = 4	
7.Course administrator's name (mention all, if more than one name)	
Name: Karema mohamed Abuelfotouh soliman Email: Karema.mohammed@alayen.edu.eg	
8.Course Objectives	
Course Objectives	1. Identify the mechanism of disease occurrence from the physiological perspective of the human body. 2. Identify the pathological effects during the occurrence of the disease and after recovery from it. 3. Identify the clinical symptoms of the disease.
9.Teaching and Learning Strategies	
Strategy	- PowerPoint and Multimedia presentation - Class discussion. - Visual aids: Utilize visual aids such as pictures, charts, graphs, diagrams

- **PowerPoint Presentations:** Visually rich presentations with diagrams, flowcharts, and clinical correlations.
- **Case Studies and Clinical Scenarios:** Used to integrate theoretical knowledge with clinical applications.
- **Whiteboard and Visual Aids:** For step-by-step explanation of mechanisms and disease pathways.
- **Virtual Simulations:** Digital tools and simulations to demonstrate physiological and pathological changes.
- **Assessment Tools:** MCQs, short answer questions, and assignments aligned with course learning outcomes.
- **Reference Guidelines:** Basic clinical and diagnostic guidelines to support understanding of disease relevance.

10.Course Structure

1. Course Structure (Theory)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Understand the basic concepts and scope of pathophysiology and its relationship to disease development. They will explain how normal physiological processes are altered in disease states.	Introduction to pathophysiology	smartboard/ Presentation slides/ discussion	oral questions and written exams
2	3	Describe the causes and mechanisms of cell injury and cellular adaptation. They will differentiate between reversible degeneration and irreversible cell death (necrosis).	Cell injury and tissue response; Degeneration; Necrosis.	smartboard/ Presentation slides/ discussion	oral questions and written exams
3	3	Explain the mechanisms, mediators, and stages of acute and chronic inflammation. They will correlate inflammatory responses with clinical signs and disease progression.	Inflammation (acute and chronic inflammation)	smartboard/ Presentation slides/ discussion	oral questions and written exams
4	3	Explain the pathophysiology of fluid, electrolyte, and acid-base balance	Syndrome of inappropriate	smartboard/ Presentation	oral questions

		disorders. They will differentiate between metabolic and respiratory disturbances based on underlying mechanisms.	secretion of ADH; Diabetes insipidus; Metabolic acidosis and alkalosis; Respiratory acidosis and alkalosis.	slides/ discussion	and written exams
5	3	Describe the etiopathogenesis and pathophysiological changes in major cardiac diseases. They will relate structural and functional abnormalities of the heart to clinical manifestations.	MI; Rheumatic heart disease; Heart failure.	smartboard/ Presentation slides/ discussion	oral questions and written exams
6	3	Explain the pathophysiology of obstructive and vascular lung diseases. They will correlate pathological changes in the respiratory system with impaired gas exchange.	Emphysema and bronchiectasis; Cystic fibrosis; Pulmonary embolism; Pulmonary hypertension.	smartboard/ Presentation slides/ discussion	oral questions and written exams
7	3	Describe the mechanisms of renal injury and progression of kidney diseases. They will distinguish between acute and chronic renal failure based on pathophysiology and outcomes.	Hypertensive glomerular disease; Pyelonephritis; Drug related nephropathies; Acute renal failure; Chronic renal failure.	smartboard/ Presentation slides/ discussion	oral questions and written exams
8	3	Explain the pathophysiological mechanisms underlying functional and	Irritable bowel syndrome. Crohn's disease; Diarrhea; Celiac disease.	smartboard/ Presentation slides/ discussion	oral questions and written exams

		inflammatory gastrointestinal disorders. They will relate intestinal dysfunction to clinical symptoms and complications.			
9	3	Explain the autoimmune basis and pathophysiology of Graves' disease. They will relate excess thyroid hormone production to systemic clinical manifestations.	Graves's disease	smartboard/ Presentation slides/ discussion	oral questions and written exams
10	3	Describe the causes and mechanisms leading to thyrotoxicosis. They will explain the physiological effects of elevated thyroid hormones on body systems.	Thyrotoxicosis	smartboard/ Presentation slides/ discussion	oral questions and written exams
11	3	Explain the pathophysiology of insulin resistance and impaired glucose metabolism. They will relate metabolic abnormalities to long-term complications of diabetes.	Diabetes mellitus and metabolic syndrome	smartboard/ Presentation Slides /discussion	oral questions and written exams
12	3	Describe the metabolic disorders affecting bone density and mineralization. They will differentiate between osteoporosis and osteomalacia/rickets based on underlying mechanisms.	Metabolic and rheumatic disorders of skeletal system: Osteoporosis; Osteomalacia and rickets.	smartboard/ Presentation slides/ discussion	oral questions and written exams
13	3	Explain the inflammatory and degenerative mechanisms involved in common joint disorders. They will relate joint pathology to pain,	Ankylosing spondylitis Gout; Osteoarthritis syndrome.	smartboard/ Presentation Slides /discussion	oral questions and written exams

		stiffness, and loss of mobility.			
14	3	Classify the types of hypersensitivity reactions and explain their mechanisms. They will correlate immune-mediated tissue damage with clinical presentations.	Alteration in immune response: Hypersensitivity disorders.	smartboard/ Presentation slides/ discussion	oral questions and written exams
15	3	Explain the causes and pathophysiology of primary and secondary immunodeficiency disorders. They will relate impaired immune function to increased susceptibility to infections.	Immunodeficiency disorders.	smartboard/ Presentation slides/ discussion	oral questions and written exams

11.Course Evaluation

Midterm Exam 15 marks

Quizzes and activities 5 marks

Practical 20 marks

Final Exam 60 marks

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	1– Carol M. Porth (2011). Essentials of Pathophysiology: Concepts of Altered Health States. 3 rd Edition. Lippincott Williams & Wilkins.
Main references (sources)	1– Jacquelyn L. Banasik and Lee-ellen C. Copstead (2019). Pathophysiology. 6 th Edition. Elsevier Inc.
Recommended books and references (scientific journals, reports...)	1– Lachel Story (2018). Pathophysiology: a Practical Approach. Jones & Bartlett Learning. 2– Barbara E. Gould and Ruthanna Dyer (2011). Pathophysiology for The Health Professions. 4 th Edition. Elsevier Inc. 3– Julie Munden (2007). Pathophysiology (Lippincott manual of nursing practice series). Lippincott Williams & Wilkins.
Electronic References, Websites	



ALAYEN IRAQI
UNIVERSITY

Course Description Form

1. Course Name:	
Pharmaceutical and Cosmetic Preparations	
2. Course Code:	
PH3203	
3. Semester / Year:	
Second semester/ third year	
4. Description Preparation Date:	
2026–2025	
5. Available Attendance Forms:	
Full–time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 hours/week (theoretical), 2 hours/week (practical), total units = 4	
7. Course administrator's name (mention all, if more than one name)	
Name: Associated prof. Dr. Mohammed Sherif saddik Ibrahim Email: Sherif@alayen.edu.iq	
8. Course Objectives	
Course Objectives	1) Understand the principles, preparation, and stability of pharmaceutical emulsions, including surfactant systems and microemulsions. 2) Study the formulation, compounding, and use of semisolid dosage forms such as ointments, creams, gels, and dermatologic preparations. 3) Explore the design and clinical applications of suppositories, vaginal inserts, and medication sticks, including manufacturing and quality control. 4) Learn the physicochemical and therapeutic considerations for selecting appropriate bases and packaging for topical and rectal formulations. 5) Examine the formulation strategies and clinical uses of cosmetic products including sunscreens, exfoliants, and anti–aging preparations. 6) Apply knowledge of formulation science to ensure safety, effectiveness, and patient acceptability of pharmaceutical and cosmetic products
9. Teaching and Learning Strategies	
Strategy	1– Lectures

	2– Class discussion 3– Quizzes 4–Reports				
10. Course Structure (Theory)					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Explain the concept, types and pharmaceutical importance of emulsions. Identify the methods used in the preparation of emulsions.	Emulsions: An introduction to emulsions and their preparation methods	smartboard/ Presentation slides/ discussion	oral questions and written exams
2	3	Classify emulsifying agents based on source and mechanism of action. Select suitable emulsifiers for different emulsion systems.	Emulsions: Types of emulsifying agents	smartboard/ Presentation slides/ discussion	oral questions and written exams
3	3	Describe traditional and modern emulsion preparation methods. Apply appropriate techniques to ensure emulsion stability.	Methods of emulsion preparation	smartboard/ Presentation slides/ discussion	oral questions and written exams
4	3	Differentiate between ointments, creams, and pastes. Select suitable semisolid dosage forms for topical use.	Semisolid dosage form: Ointments, creams and pastes	smartboard/ Presentation slides/ discussion	oral questions and written exams
5	3	Classify different types of ointment bases. Choose appropriate bases according to drug and therapeutic needs.	Semisolid dosage form: Types of ointment bases	smartboard/ Presentation slides/ discussion	oral questions and written exams

6	3	Describe specific requirements of ophthalmic ointments. Explain factors affecting safety effectiveness.	Properties of ophthalmic ointments	smartboard/ Presentation slides/ discussion	oral questions and written exams
7	3	Classify different types of suppository bases. Explain their influence on drug release and stability.	Suppositories base types	smartboard/ Presentation slides/ discussion	oral questions and written exams
8	3	Describe fusion compression methods for preparation. Apply displacement volume calculations accurately.	Preparation of Suppositories	smartboard/ Presentation slides/ discussion	oral questions and written exams
9	3	Explain suitable packaging materials and storage conditions for suppositories. Evaluate factors affecting the physical and chemical stability of suppository formulations.	Packaging and storage & Stability	smartboard/ Presentation slides/ discussion	oral questions and written exams
10	3	Identify physical, chemical, and therapeutic incompatibilities. Propose methods to prevent or resolve incompatibilities	Incompatibilities: Identification of physical, chemical and therapeutic incompatibilities	smartboard/ Presentation slides/ discussion	oral questions and written exams
11	3	Explain principles of cosmetic formulation for skin care products. Identify main ingredients and their functions.	Cosmetic Formulations Introduction & Cosmetic formulation of skin care products	smartboard/ Presentation slides/ discussion	oral questions and written exams

12	3	Describe composition purpose of toners astringents. Differentiate between deodorants antiperspirants.	Toners and astringents & Antiperspirants	smartboard/ Presentation slides/ discussion	oral questions and written exams
13	3	Classify sunscreens explain their mechanism action. Interpret SPF value and photoprotection claim.	Sunscreens	smartboard/ Presentation slides/ discussion	oral questions and written exams
14	3	Identify causes of aging and anti-aging agents. Explain formulation approaches for anti-aging products.	Anti-aging skin care formulations	smartboard/ Presentation slides/ discussion	oral questions and written exams
15	3	Explain clinical effects of topical exfoliation. Identify key formulation considerations for safety and efficacy.	Topical exfoliation— clinical effects and formulating considerations	smartboard/ Presentation slides/ discussion	oral questions and written exams

11. Course Evaluation

Mid term Exam 15 marks
 Quizzes and activities 5 marks
 Practical 20 marks
 Final Exam 60 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)

1-Pharmaceutical dosage forms and drug delivery systems by Haward A. Ansel; 11th edition, 2017. Lippincott Williams & Wilkins, a Wolters Kluwer business

	2. Sprewell's American pharmacy.
Main references (sources)	Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 3rd ed. Michael E. Aulton (Author) Churchill
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Main references (sources)	1–Indian Pharmacopoeia, Egyptian Pharmacopoeia. 2–De Smet, P.A., Keller, K., Hausel, R. and Chandler, R.F., “Adverse effects of herbal drugs”, Springer Verlag, Berlin, Heidelberg, New York, London, Paris, Tokyo, Hong Kong, Vol. I (1993). 3–Weiss R.F. and Fintelmann V. “ Herbal Medicine”, Thieme, Stuttgart, New York, 2nd Ed. (2000).
Recommended books and references (scientific journals, reports...)	Scientific journals in basic specializations
Electronic References, Websites	Websites of Arab and foreign universities and pharmaceutical companies

Course Description Form

1. Course Name:	
Pharmaceutical technology I	
2. Course Code:	
PH3103	
3. Semester / Year:	
1 st semester/ 3 rd year	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 hours/week (theoretical), 2 hours/week (practical), total units = 4	
7. Course administrator's name (mention all, if more than one name)	
Name: 1-Associated prof. Dr. Mohammed Sherif saddik Ibrahim 2-Assist. Lecturer Mays Mazin AL-Hamadanl Email: 1-Sherif@alayen.edu.iq 2-Mais.yahya@alayen.edu.iq	
8. Course Objectives	
Course Objectives	The use of pharmacy technology in pharmacy includes methods of preparing and detecting different drug forms, calculations of medicinal preparations in addition to identifying the physiochemical properties of pharmaceutical substances and methods of dealing with them
9. Teaching and Learning Strategies	
Strategy	1- Lectures 2- Class discussion 3- practical work 3- Quizzes 4-Reports
10. Expected learning outcomes	

11. Course Structure (Theory)					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Analyze the physical and chemical properties of active pharmaceutical ingredients (APIs) and their impact on dosage form design and stability	Pharmaceutical preformulation	smartboard/ Presentation slides/ discussion	oral questions and written exams
2	3	Define pharmaceutical solutions and classify them based on the nature of solutes, solvents, and concentration.	Official solutions; classification of official solutions; preparation and uses	smartboard/ Presentation slides/ discussion	oral questions and written exams
3	3	Explain factors affecting solubility, differentiate between solubility and rate of solution,	Aqueous solutions containing aromatic principles; aromatic waters;	smartboard/ Presentation slides/ discussion	oral questions and written exams

		and master the preparation of solutions containing non-volatile substances.	methods of preparations; stability		
4	3	Compare sugar-based syrups and non-sugar alternatives (e.g., Sorbitol), while evaluating their preparation techniques and physicochemical stability	Syrups: sugar based syrups; artificial and sorbitol based syrups; stability of syrups	smartboard/ Presentation slides/ discussion	oral questions and written exams
5	3	Spirits and Elixirs): Comprehend the mechanisms of preparing Spirits and Elixirs using mixed solvent systems.	Preparation of solutions using mixed solvent systems; spirits, and elixirs	smartboard/ Presentation slides/ discussion	oral questions and written exams
6	3	Differentiate between various extraction methods,	Extraction; maceration and percolation.	smartboard/ Presentation slides/ discussion	oral questions and written exams

		specifically Maceration and Percolation.			
7	3	Describe the characteristics of tinctures, fluid extracts, solid extracts, and resins, understanding their scientific differences.	Tinctures; fluid extracts; extracts of resins and oleoresins.	smartboard/ Presentation slides/ discussion	oral questions and written exams
8	3	Describe the characteristics of tinctures, fluid extracts, solid extracts, and resins, understanding their scientific differences.	Identification of the constituents of Tinctures dosage form and its methods of preparation.	smartboard/ Presentation slides/ discussion	oral questions and written exams
9	3	Identify the components of pharmaceutical suspensions and understand the physical balance required for the stability of dispersed solid particles.	Coarse dispersion. suspensions.	smartboard/ Presentation slides/ discussion	oral questions and written exams

10	3	Identify the components of pharmaceutical suspensions and understand the physical balance required for the stability of dispersed solid particles.	Coarse dispersion.	smartboard/ Presentation slides/ discussion	oral questions and written exams
11	3	Identify the constituents of pharmaceutical suspensions and the methods used for their preparation.	Suspension: Identification of the constituents of suspension dosage form and its methods of preparation	smartboard/ Presentation Slides /discussion	oral questions and written exams
12	3	Classify types of sprays and understand their mechanisms of action and benefits for respiratory or topical drug delivery	Aerosol systems Aerosol container and valve assembly Metered-dose inhalers	smartboard/ Presentation slides/ discussion	oral questions and written exams
13	3	Explain the scientific principles of foam	Types of aerosols Advantages of the aerosol dosage form	smartboard/ Presentation Slides /discussion	oral questions and written

		preparation and their therapeutic advantages compared to conventional dosage forms.	The aerosol principle		exams
14	3	Distinguish between primary and secondary parenteral products and understand the rigorous manufacturing requirements, such as sterility and pyrogen-free standards	Parenterals dosage form Parenteral routes of administration Official types of injections Solvents vehicles for injections	smartboard/ Presentation slides/ discussion	oral questions and written exams
15	3	Distinguish between small and large volume parenterals and understand the requirements for pyrogen-free and sterile manufacturing	Small volume parenterals Large volume parenterals	smartboard/ Presentation slides/ discussion	oral questions and written exams
12. Course Evaluation					
Mid term Exam 15 marks					

Quizzes and activities 5 marks

Practical 20 marks

Final Exam 60 marks

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1–Pharmaceutical dosage forms and drug delivery systems by Haward A. Ansel; 10th edition, 2015.Lippincott Williams & Wilkins, a Wolters Kluwer business 2. Sprowels American pharmacy.
Main references (sources)	Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 3rd ed. Michael E. Aulton (Author) Churchill
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Pharmacognosy II	
2. Course Code:	
PH3210	
3. Semester / Year:	
Third year / First semester	
4. Description Preparation Date:	
2026-2025	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours/week (theoretical), 2 hours/week (practical), total units = 3	
7. Course administrator's name (mention all, if more than one name)	
Name: Hussein hamed hayal Email: hussein.hamed@alayen.edu.iq	
8. Course Objectives	
Course Objectives	1- Understanding the scientific foundations and basic concepts of botany and plant application to pharmaceutical compounds. 2- Explaining the importance of studying the phytochemical reactions of chemical compounds in designing and developing drugs. 3- Introducing students to biological functional groups and analyzing their impact on the biological activity of drugs. 4- Providing students with the knowledge necessary to understand the Extraction methods.
9. Teaching and Learning Strategies	
Strategy	1-lectures included multimedia lectures 2- power point presentation 3- practical work 4- open discussion 5- class activity 6-Self learning

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Understand the general biosynthetic pathways of secondary metabolites and recognize their types and significance in medicinal plants	Introduction: General biosynthesis pathways of secondary metabolites.	1–lectures included multimedia lectures 2– power point presentation	1–written exam 2– Quiz 3–midterm exam 4– final exam
2	3	Explain the biosynthesis of glycosides and their physical and chemical properties, including solubility, stability, and reactivity. Distinguish between major types of glycosides—cardiac, saponin, anthraquinone, flavonoid, and cyanophore glycosides—describing their chemical structures, biological activities, and therapeutic uses.	Glycosides: Biosynthesis, physical and chemical properties; cardiac glycosides; saponin glycosides; anthraquinone glycosides; flavonoid glycosides; cyanophore glycosides.	3– open discussion 5– class activity 6–Self learning	
3	3	Identify and describe different types of glycosides—iso thiocyanate, aldehyde, alcoholic, phenolic, lactone, coumarins, and chromones—explaining their chemical structures, biosynthesis, properties, and pharmacological significance	Glycosides: Iso thiocyanate glycosides; aldehyde glycosides; alcoholic glycosides; phenolic glycosides; lactone glycosides; coumarins and chromones		
4	3	Explain the chemical composition, classification,	Resins and resin combination; tannins		

		and properties of resins, resin combinations, and tannins, and describe their therapeutic uses and pharmacological effects			
5	3	Describe the composition, physical and chemical properties of lipids, including fixed oils and waxes, and explain their sources, extraction methods, and pharmaceutical or therapeutic applications.	Lipids: fixed oils and waxes.		
6	3	Understand the basic concepts and chemistry of volatile oils, including their composition, extraction methods, and pharmacological properties	Volatile oils: Introduction; chemistry of volatile oils;		
7	3	Explain the occurrence, chemical structure, and properties of ketones as components of volatile oils, and describe their biological activities and therapeutic applications	Ketones as volatile oils;		
8	3	Identify common non-medical toxic plants, describe their toxic constituents, mechanisms of toxicity, and potential health hazards, and understand basic safety and preventive measures.	Non- medicinal toxic plants.		
9	3	Describe the classification, chemical properties, sources, and physiological	Vitamins		

		roles of vitamins, and explain the consequences of their deficiency or excess on human health.			
10	3	Explain the occurrence, chemical structures, and properties of oxides and esters as components of volatile oils, and describe their pharmacological activities and therapeutic uses	Oxides as volatile oils; Ester as volatile oils;		
11	3	Describe the occurrence, chemical structures, and properties of hydrocarbons and alcohols as components of volatile oils, and explain their pharmacological activities and therapeutic applications.	hydrocarbons as volatile oils; alcohols as volatile oils		
12	3	Explain the occurrence, chemical structure, and properties of aldehydes as components of volatile oils, and describe their pharmacological activities and therapeutic uses	biosynthesis of volatile oils;; Aldehydes as volatile oils.		
13	3	Describe the occurrence, chemical structure, and properties of phenols in volatile oils, and explain their pharmacological effects and therapeutic applications.	Phenols as volatile oils;		
14	3	Explain the occurrence, chemical structure, and properties of phenolic	Phenolic ethers as volatile oils.		

		ethers in volatile oils, and describe their pharmacological activities and therapeutic uses.			
15	3	describe the structure, classification, and chemical properties of amino acids, and explain their biological roles, including protein synthesis and metabolic functions.	Amino acids		

11. Course Evaluation

Written exam 60 marks

Midterm 15 marks

Practical 25 marks

Total = 100 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Essential Books (Text Books) 1–Trease, G.E. and Evans, W.C. “Trease and Evans’ Pharmacognosy” WB Saunders Co. Ltd., London, Philadelphia, Toronto, Sydney, Tokyo (1994, 2005). 2– Wallis, T.A. “Textbook in Pharmacognosy” CBS publisher & Distributers, First Indian edition (1985). 3– Mahran, G.H., “Medicinal Plants” 1st Ed.(1967). 4–Saber, A.H., “Practical Pharmacognosy” El–Shaab Printing House, 4th Ed. (1966). 5–Jackson, B.P. and Snowdon D.W., “Atlas of microscopy of medicinal plants, herbs and spices” Belhaven Press, Printer Publishers, London. (1990).
Main references (sources)	1–Indian Pharmacopoeia, Egyptian Pharmacopoeia. 2–De Smet, P.A., Keller, K., Hausel, R. and Chandler, R.F., “Adverse effects of herbal drugs”, Springer Verlag, Berlin, Heidelberg, New York, London, Paris, Tokyo, Hong Kong, Vol. I (1993).

	3-Weiss R.F. and Fintelmann V. “ Herbal Medicine”, Thieme, Stuttgart, New York, 2nd Ed. (2000).
Recommended books and references (scientific journals, reports...)	Scientific journals in basic specializations
Electronic References, Websites	Websites of Arab and foreign universities and pharmaceutical companies

Course Description Form

1. Course Name:	
Pharmacognosy III	
2. Course Code:	
PH3210	
3. Semester / Year:	
Third year / second semester	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours/week (theoretical), 2 hours/week (practical), total units = 3	
7. Course administrator's name (mention all, if more than one name)	
Name: Hussein hamed hayal Email: hussein.hamed@alayen.edu.iq	
8. Course Objectives	
Course Objectives	1- Understanding the scientific foundations and basic concepts of botany and plant application to pharmaceutical compounds. 2- Explaining the importance of studying the phytochemical reactions of chemical compounds in designing and developing drugs. 3- Introducing students to biological functional groups and analyzing their impact on the biological activity of drugs. 4- Providing students with the knowledge necessary to understand the Extraction methods.
9. Teaching and Learning Strategies	
Strategy	1-lectures included multimedia lectures 2- power point presentation 3- practical work 4- open discussion 5- class activity 6-Self learning

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Understand the definition, general characteristics, classification, and biological significance of alkaloids, and recognize their therapeutic and toxicological importance	Alkaloids: Introduction	1–lectures included multimedia lectures 2– power point presentation 3– open discussion 5– class activity 6–Self learning	1–written exam 2– Quiz 3–midterm exam 4– final exam
2	3	Describe the physical and chemical properties of alkaloids, focusing on isoquinoline alkaloids, and explain their structural features, biosynthesis, and pharmacological activities	Physical and chemical properties of Alkaloids: iso-quinoline alkaloids;		
3	3	Describe the physical and chemical properties of quinoline, tropane, and pyridine alkaloids, and explain their structures, biosynthesis, pharmacological activities, and therapeutic applications	Quinoline tropan alkaloids pyridine,		
4	3	Explain the structure, chemical properties, biosynthesis, and pharmacological activities of indole alkaloids, highlighting their therapeutic uses and biological significance	Indole alkaloids.		
5	3	Describe the structure, chemical properties, biosynthesis, and biological activities of imidazole alkaloids, and explain their therapeutic applications and pharmacological significance.	imidazole alkaloids;		

6	3	Explain the structure, chemical properties, biosynthesis, and pharmacological activities of piperidine alkaloids, and describe their therapeutic uses and biological significance	piperidine alkaloids;		
7	3	Describe the structure, chemical properties, biosynthesis, and pharmacological activities of steroidal alkaloids, and explain their therapeutic applications and biological significance.	Alkaloids: Steroidal alkaloids;		
8	3	Explain the structure, chemical properties, biosynthesis, and pharmacological activities of amine and purine alkaloids, highlighting their therapeutic uses and biological significance.	alkaloidal amines; purine alkaloids.		
9	3	Describe the structure, chemical properties, biosynthesis, and pharmacological activities of lupinane alkaloids, and explain their therapeutic applications and biological significance.	lupinane alkaloids;		
10	3	Explain the structure, chemical properties, biosynthesis, and pharmacological activities of tropane alkaloids, and describe their therapeutic	tropane alkaloids		

		uses and biological significance.			
11	3	Identify the botanical characteristics, chemical constituents, and therapeutic uses of basil and peppermint, and explain their pharmacological activities and applications in medicine and aromatherapy.	basil, Peppermint,		
12	3	Understand the fundamentals and principles of phytotherapy, including the use of plant-based medicines, their mechanisms of action, therapeutic applications, and role in modern healthcare	phytotherapy :Introduction , principles,		
13	3	Describe the role and use of medicinal plants in selected healthcare systems, including their therapeutic applications, cultural significance, and integration into modern medicine	medicinal plants in selected health care systems		
14	3	Explain the importance of natural products in medicine and pharmacy, including their roles as therapeutic agents, sources of bioactive compounds, and contributions to drug discovery and development	Importance of natural products		
15	3	Describe the use of phytomedicines in pharmacy and medicine, including their therapeutic applications, active constituents,	phytomedicines used in pharmacy & medicine		

	mechanisms of action, and role in modern healthcare			
11. Course Evaluation Written exam 60 marks Midterm 15 marks Practical 25 marks Total = 100 marks				
12. Learning and Teaching Resources				
Required textbooks (curricular books, if any)	Essential Books (Text Books) 1–Trease, G.E. and Evans, W.C. “Trease and Evans’ Pharmacognosy” WB Saunders Co. Ltd., London, Philadelphia, Toronto, Sydney, Tokyo (1994, 2005). 2– Wallis, T.A. “Textbook in Pharmacognosy” CBS publisher & Distributers, First Indian edition (1985). 3– Mahran, G.H., “Medicinal Plants” 1st Ed.(1967). 4–Saber, A.H., “Practical Pharmacognosy” El-Shaab Printing House, 4th Ed. (1966). 5–Jackson, B.P. and Snowdon D.W., “Atlas of microscopy of medicinal plants, herbs and spices” Belhaven Press, Printer Publishers, London. (1990).			
Main references (sources)	1–Indian Pharmacopoeia, Egyptian Pharmacopoeia. 2–De Smet, P.A., Keller, K., Hausel, R. and Chandler, R.F., “Adverse effects of herbal drugs”, Springer Verlag, Berlin, Heidelberg, New York, London, Paris, Tokyo, Hong Kong, Vol. I (1993). 3–Weiss R.F. and Fintelmann V. “ Herbal Medicine”, Thieme, Stuttgart, New York, 2nd Ed. (2000).			

Recommended books and references (scientific journals, reports...)	Scientific journals in basic specializations
Electronic References, Websites	Websites of Arab and foreign universities and pharmaceutical companies

Course Description Form

1. Course Name:	
Pharmacology I	
2. Course Code:	
PH3202	
3. Semester / Year:	
Third year second semester 2024–2025	
4. Description Preparation Date:	
2025–2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 hours x 15 weeks = 45 hrs. /3 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Ahmed Atwa Email: ahmed-atwa@eru.edu.eg	
8. Course Objectives	
Course Objectives	1. The aims of the course are to provide students with general principles of pharmacology presented; such as pharmacokinetics, pharmacodynamics, receptor theory, drug interaction and principle of therapeutics. 2. This course also integrates principles of pharmacology with conceptual knowledge of physiology and pathophysiology to disease processes regarding the drugs acting on the autonomic nervous system as well as neuromuscular system. 3. The current course also enables the students to study principles of pharmacology of chemotherapeutic drugs (antimicrobials) with

	conceptual knowledge of physiology and pathophysiology disease processes regarding the infectious diseases as well as the basic principles of prophylactic use of drugs for the preventive care of both individual and community.
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9. Teaching and Learning Strategies

Strategy	1) Lectures included multimedia lectures 2) White board and Power point presentation 3) Open discussion 4) Class activity 5) Brain storming 6) Inverted class 7) Visual aids: Utilize visual aids such as pictures, charts, graphs, diagrams 8) Hybrid education
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3. Enhancing the spirit of cooperation and teamwork among students

4. Applying ethical theories, rules, guidelines and laws governing scientific conducts

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Identify knowledge about advantages and disadvantages of different routes of administration and pharmacodynamics principles of the drugs.	General introduction to pharmacology	1) Lectures included multimedia lectures 2) White board and Power point presentation	1) Short MCQs 2) Oral exam and direct questions in the class
2	3	Identify basic principles of drug absorption, distribution, metabolism and excretion.	Pharmacokinetics	3) Open discussion	3) Midterm exam 4) Electronic exams on the electronic platform
3	3	Identify knowledge about pharmacodynamics	Drug receptor interaction and pharmacodynamics	4) Class activity 5) Brain storming	

		principles of the drugs.		6) Inverted class	5) Final exam
4	3	Describe organization of the autonomic nervous system Differentiate between sympathetic and parasympathetic systems	Autonomic nervous system	7) Visual aids: Utilize visual aids such as pictures, charts, graphs, diagrams	
5	3	Identify drugs acting on the parasympathetic nervous system and their uses in various conditions	Cholinergic system	8) Hybrid education	
6	3	Describe drugs that reduce the parasympathetic nervous system activity in several diseases	Anticholinergic agents		
7	3	Identify drugs acting on the sympathetic nervous system and their uses in various conditions	Adrenergic system		
8	3	Describe mechanisms of action, therapeutic uses, and limitations of anticancer drugs. Recognize adverse effects, dose-limiting toxicities, and supportive care needs for antibiotics.	Principal of antimicrobial therapy		
9	3	Describe therapeutic uses, contraindications, and adverse effects of cell wall inhibitors.	B-lactam and other cell wall synthesis inhibitor antibiotics		
10	3	Describe therapeutic uses, contraindications,	Quinolones, folate antagonists and		

		and adverse effects of quinolones and folate antagonists.	urinary tract antiseptics		
11	3	Describe therapeutic uses, contraindications, and adverse effects of anti-T.B. drugs.	Antimycobacterium drugs		
12	3	Describe therapeutic uses, contraindications, and adverse effects of antifungal drugs.	Antifungal drugs		
13	3	Describe therapeutic uses, contraindications, and adverse effects of antiprotozoal drugs.	Antiprotozoal drugs		
14	3	Describe therapeutic uses, contraindications, and adverse effects of anthelmintic drgs.	Anthelmintic drugs		
15	3	Describe therapeutic uses, contraindications, and adverse effects of antiviral drugs.	Antiviral drugs		

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports.... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	○ Lippincott illustrated reviews in pharmacology, Karen Whalen, Wolters Kluwer, 8th edition
Main references (sources)	○ Lippincott illustrated reviews in pharmacology, Karen Whalen, Wolters Kluwer, 8th edition

Recommended books and references (scientific journals, reports...)	○ Katzung BG, Master SB, Trevor AJ: Basic & Clinical Pharmacology (Lange Basic science), McGraw–Hill Medical, London, 12th edition, 2016, 1264 pages. ○ Laurence LB, Bruce AC, Bjorn CK: GOODMAN & GILMAN'S, The Pharmacological Basis of Therapeutics, McGraw–Hill Medical, London, International edition, 2014. ○ Lippincott illustrated reviews in pharmacology, Karen Whalen, Wolters Kluwer ○ Rang and dale's pharmacology, El Sevier
Electronic References, Websites	○ Pubmed (www.ncbi.nlm.nih.gov/pmc/) ○ Sciencedirect (www.sciencedirect.com) ○ EKB (Egyptian knowledge bank) (www.ekb.eg)

Course Description Form

1. Course Name:	
Public health/ theory	
2. Course Code:	
PH4105	
3. Semester / Year:	
First semester/ fourth	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hr x 15 weeks = 30 hrs/ 2units	
7. Course administrator's name (mention all, if more than one name)	
Name: Moatasem Al-Salih Email: moatasem.alsalih@alayen.edu.iq	
8. Course Objectives	
Course Objectives	1. Fundamental Concepts: Understand public health principles, scope, and global impact. 2. Epidemiology & Disease Control: Analyze disease transmission, prevention, and epidemiological methods. 3. Public Health Interventions: Identify strategies for health promotion, vaccinations, and environmental health. 4. Healthcare Systems & Policies: Examine health services organization, insurance, and health determinants. 5. Data & Ethics: Interpret epidemiological data, apply quality assurance, and uphold ethical standards. 6. This course empowers students to contribute effectively to community health and policy development.

9. Teaching and Learning Strategies

Strategy	1-lectures included multimedia lectures 2- Power Point presentation 3- practical work 4- open discussion
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10. Course Structure

Week	Hours	Intended Learning Outcomes (ILOs)	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2	Understand public health scope, core concerns, determinants, challenges, and societal impact.	Introduction: The Scope and Concerns of Public Health	1. Whiteboard, PowerPoint, and data show presentation 2. Class discussion 3. Presentation of cases 4. Handouts 5. Visual aids (pictures, charts, graphs, diagrams)	1. Short MCQs 2. Oral exam and direct questions in class 3. Midterm exam 4. Electronic exams on the online platform 5. Final exam
2	2	Understand epidemiology principles, population screening methods, benefits, limitations, and applications.	Epidemiology & Population Screening		
3	2	Understand preventive medicine principles, disease prevention strategies, and control measures.	Prevention & Control of Disease (Preventive Medicine)		
4	2	Understand health insurance systems, organization of health services, access, efficiency.	Health Insurance (Organization of Health Services)		
5	2	Understand gastrointestinal infection transmission, communicable diseases, prevention, and control measures.	Communicable Diseases (Transmission of Infection Acquired Through the Gastrointestinal Tract)		

6	2	Apply control measures to prevent gastrointestinal infections and reduce disease transmission.	Control of Infection Acquired Through the Gastrointestinal Tract		
7	2	Understand transmission through mucous membranes and apply effective infection control measures.	Transmission & Control of Infection Acquired Through Mucous Membranes		
8	2	Understand airborne infection transmission routes, risk factors, prevention, and control strategies.	Transmission of Airborne Infections		
9	2	Apply effective measures to control airborne infections and reduce transmission risks.	Control of Airborne Infections		
10	2	Understand chronic diseases, public mental health, impacts, prevention, and health promotion.	Non-Communicable Diseases (Chronic Disease, Public Mental Health)		

11. Course Evaluation

Written exam 70 marks

Midterm 20 marks

Course work 10 marks

Total =100 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Lucas AO, Gilles HM, (Eds), Short Textbook of Public Health Medicine for the Tropics, (4th Ed), 2003
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Main references (sources)	
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Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Biopharmaceutics	
2. Course Code:	
PH4104	
3. Semester / Year:	
First semester/ fourth year	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours/week (theoretical), 2 hours/week (practical), total units = 3	
7. Course administrator's name (mention all, if more than one name)	
Name: Lecturer Dr. Samer Khalid Ali Email: Samer.ali@alayen.edu.iq	
8. Course Objectives	
Course Objectives	This course deals with the physical and chemical properties of drug substances, dosage form and the biological effectiveness of the drug or drug product upon administration (route of administration), including drug availability in the human body from a given dosage form. The pharmacokinetic part of the course deals with the time-course of the drug in the biological system, and quantification of drug concentration pattern in normal subjects and in certain disease states. Also, it concerns with the main processes of drug journey absorption, distribution, metabolism and excretion.
9. Teaching and Learning Strategies	
Strategy	Lectures and Presentation, Interactive discussions related photos and videos, brainstorm, and Inverted classrooms with learning strategies
10. Course Structure (Theory)	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Describe Biopharmaceutics and Pharmacokinetics	Introduction to Biopharmaceutics and Pharmacokinetics	smartboard/ Presentation slides/ discussion	oral questions and written exams
2	2	Understand biopharmaceutics standards, drug absorption, and mechanisms absorption	Biopharmaceutics standards: Drug absorption and its mechanism	smartboard/ Presentation slides/ discussion	oral questions and written exams
3	2	Explain absorption kinetics and factors affecting drug absorption	Absorption kinetics: Factors effect absorption	smartboard/ Presentation slides/ discussion	oral questions and written exams
4	2	Describe physicochemical factors affecting drug absorption, including the effects of drugs and different additives	Physicochemical Factors effect on absorption: Effect of drug and different additives	smartboard/ Presentation slides/ discussion	oral questions and written exams
5	2	Analyze the impact physicochemical factors and	Physicochemical factors effect on absorption: Effect of different	smartboard/ Presentation slides/ discussion	oral questions and written

		different additives absorption from various dosage forms.	additives on different dosage forms		exams
6	2	Understand the one– compartment system and apply the one– compartment model for oral and intravenous administration.	One compartment system: The one comp model for oral and intravenous injections	smartboard/ Presentation slides/ discussion	oral questions and written exams
7	2	Explain multi– compartment systems, focusing on two– compartment models for oral and intravenous dose	Multi–compartment system: Two– compartment models for oral and intravenous doses	smartboard/ Presentation slides/ discussion	oral questions and written exams
8	2	Describe oral absorption kinetics, including zero–order and first–order absorption kinetics	Oral absorption kinetic: The zero and first oral absorption kinetic	smartboard/ Presentation slides/ discussion	oral questions and written exams
9	2	Understand	Multiple oral Dosage	smartboard/	oral

		multiple oral dosage kinetics and explain how steady-state (plateau) concentration achieved.	kinetic: How to reach a plateau	Presentation slides/ discussion	questions and written exams
10	2	Explain nonlinear kinetics and identify the reasons nonlinear absorption and metabolism.	Nonlinear kinetics: Reasons for nonlinear Absorption metabolism	smartboard/ Presentation slides/ discussion	oral questions and written exams
11	2	Understand bioavailability concepts, including absolute and relative bioavailability, and bioequivalence	Different bioavailability: Bioavailability and equivalences	smartboard/ Presentation Slides /discussion	oral questions and written exams
12	2	Describe drug elimination the liver and kidneys, including theories hepatic and renal drug elimination.	Elimination via liver and kidney; Theories of drug Elimination through kidney and liver	smartboard/ Presentation slides/ discussion	oral questions and written exams
13	2	Explain	Protein binding of	smartboard/	oral

		protein binding drugs and pharmacokinetic significance.	drugs	Presentation Slides /discussion	questions and written exams
14	2	Apply dose adjustment rules in patients with renal failure	Dose adjustment in renal failure patient: Rules to adjust doses in renal failure	smartboard/ Presentation slides/ discussion	oral questions and written exams

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Shargel L., Yu AB., (Eds). Applied Biopharmaceutics and Pharmacokinetics
Main references (sources)	Aulton's Pharmaceutics: The Design and Manufacture of Medicines, 3rd ed. Michael E. Aulton (Author) Churchill
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Clinical Pharmacy 1	
2. Course Code:	
Clinical Pharmacy 1/PH4103	
3. Semester / Year:	
1 nd semester / 4 th stage	
4. Description Preparation Date:	
25/1/2025	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 hours/3 units: 30hrs theoretical / 2 units 30hrs Practical / 1 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Thaer Lateef Gabar Email: Thaer.lateef@alayan.edu.iq	
8. Course Objectives	
Course Objectives	1. After completing the course, the student must acquire sufficient knowledge of the concepts of the main skills of pharmaceutical care services, basic skills in practicing pharmacy for various purposes and developing treatment plans for chronic diseases 2. Providing students with the knowledge and skills necessary to make evidence-based treatment decisions in real clinical situations 3. Promote a deep understanding of drug interactions, doses, and monitoring parameters to achieve the best therapeutic results. 4. Instill the importance of individualizing treatment plans according to the needs of each individual patient, taking into account factors such as age, chronic diseases, and lifestyle. 5. Develop the ability to critically evaluate clinical data, identify medication-related problems, and suggest appropriate interventions. 6. To learn about recent research and guidelines related to diseases to ensure that students are always aware of the latest developments in this field.
9. Teaching and Learning Strategies	
Strategy	1- Whiteboard, multimedia lectures, power point presentation 2- Class discussion 3- Case-based study 4- Handouts 5- Brainstorming 6- Problem solving 7- Case simulation in lab 8- Web site Internet evidence-based learning

		9-Role play 10-Flipped learning class			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	This lecture aims to enable students to differentiate between prescription and over-the-counter medications, appropriately respond to patient symptoms in the community pharmacy setting, and apply general principles for patient referral to physicians when necessary.	An Introduction to Community Pharmacy	1- Whiteboard, multimedia lectures, power point presentation 2- Class discussion 3- Case-based study 4- Handouts 5- Brainstorming 6-Problem solving 7-Role play 8- Evidence-based medicine internet based learning	1- Short MCQs 2- Oral exam and direct questions in the class 3- Midterm exam 4- Electronic exams on the electronic platform 5-Practical exam 6- Final exam
2	2	This lecture aims to equip students with the ability to recognize the etiology and symptoms of common minor respiratory conditions, identify warning signs that require medical referral, recommend appropriate nonpharmacologic and OTC pharmacologic treatments, and provide effective patient counseling.	Respiratory problems		
3	2	This lecture focuses on enabling students to assess common minor gastrointestinal disorders, recognize symptoms requiring referral, recommend suitable nonpharmacologic and OTC treatments, and counsel patients on	GIT problems		

		proper medication use.			
4	2	This lecture aims to develop students' skills in managing common minor pediatric conditions by recognizing symptoms, determining when referral is required, recommending appropriate nonpharmacologic and OTC therapies, and providing caregiver-focused counseling.	Childcare practice		
5	2	This lecture enables students to identify common minor skin disorders, recognize referral criteria, recommend appropriate nonpharmacologic and OTC treatments, and deliver proper patient counseling for dermatologic conditions.	Skin diseases		
6	2	This lecture aims to prepare students to manage common minor women's health problems by recognizing symptoms, identifying referral needs, recommending nonpharmacologic and OTC pharmacologic options, and providing patient-centered counseling.	Women's health		
7	2	This lecture focuses on enabling students to assess common minor CNS conditions, identify symptoms requiring	CNS problems		

		referral, recommend appropriate nonpharmacologic and OTC treatments, and counsel patients on safe medication use.			
8	2	This lecture aims to train students to recognize common minor eye conditions, identify red-flag symptoms, recommend appropriate nonpharmacologic and OTC therapies, and provide correct patient counseling.	Eye problems		
9	2	This lecture enables students to manage common minor ENT conditions through symptom assessment, referral decision-making, selection of appropriate treatments, and effective patient counseling.	ENT problem		
10	2	This lecture focuses on identifying common minor oral conditions, recognizing when referral is needed, recommending suitable nonpharmacologic and OTC treatments, and counseling patients on oral hygiene practices.	Oral health		
11	2	This lecture aims to enable students to understand the etiology and complications of obesity, recognize the benefits of weight reduction, recommend nonpharmacologic and OTC	Obesity and body control weight		

		interventions, and provide appropriate patient counseling.			
12	2	This lecture prepares students to assess pain and musculoskeletal complaints, recognize referral criteria, recommend appropriate nonpharmacologic and OTC pharmacologic treatments, and counsel patients effectively.	Pain and disorders of the musculoskeletal system		
13	2	This lecture aims to develop students' understanding of smoking-related health risks, benefits of smoking cessation, theoretical models of behavior change, and appropriate use of nicotine replacement therapy.	Nicotine replacement therapy		
14	2	This lecture enables students to evaluate dietary supplements by understanding their market, regulations, safety concerns, and issues related to quality and efficacy.	Nutritional supplements		
15	2	This lecture aims to familiarize students with recent changes in OTC drug classification and appropriate usage guidelines for newly reclassified medications.	Revision and Update in Reclassification of OTC Drugs		

13.Course Evaluation

15% Midterm exam, 20% practical , 5% (Quizzes, attendance, active participation in class, assignment), 60 % final exam

14.Learning and Teaching Resources

Required textbooks (curricular books, if any)	ALISON BLENKINSOPP, PAUL PAXTON(eds), Symptoms in the Pharmacy. A Guide to the Management of Common Illness, 8th.edition Lor waterfield, Community Pharmacy Hand Book
Main references (sources)	ALISON BLENKINSOPP, PAUL PAXTON(eds), Symptoms in the Pharmacy. A Guide to the Management of Common Illness, 8th.edition Lor waterfield, Community Pharmacy Hand Book
Recommended books and references (scientific journals, reports...)	Journal of Clinical pharmacy and therapeutics
Electronic References, Websites	UpToDate Lexicomp Medscape Drugs.com

Course Description Form

1. Course Name:	
Clinical Pharmacy 2	
2. Course Code:	
Clinical Pharmacy II/PH4203	
3. Semester / Year:	
2 nd semester / 4 th stage	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 hours/ 3 units: 30hrs theoretical / 2 units 30hrs Practical / 1 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Thaer Lateef Gabar Email: Thaer.lateef@alayen.edu.iq	
8. Course Objectives	
Course Objective	1. After completing the course, the student must acquire sufficient knowledge of the concepts of the main skills of pharmaceutical care services, basic skills in practicing pharmacy for various purposes and developing treatment plans for chronic diseases 2. Providing students with the knowledge and skills necessary to make evidence-based treatment decisions in real clinical situations 3. Promote a deep understanding of drug interactions, doses, and monitoring parameters to achieve the best therapeutic results. 4. Instill the importance of individualizing treatment plans according to the needs of each individual patient, taking into account factors such as age, chronic diseases, and lifestyle. 5. Develop the ability to critically evaluate clinical data, identify medication-related problems, and suggest appropriate interventions. 6. To learn about recent research and guidelines related to diseases to

ensure that students are always aware of the latest developments in this field.

9. Teaching and Learning Strategies

Strategy	1– Whiteboard, multimedia lectures, power point presentation 2– Class discussion 3– Case–based study 4– Handouts 5– Brainstorming 6–Problem solving 7– Case simulation in lab
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	This lecture enables students to differentiate between chronic stable angina and acute coronary syndromes, recognize clinical presentations and diagnostic criteria, identify treatment goals, design patient-specific treatment regimens, and monitor therapeutic outcomes.	Ischemic heart disease	1- Whiteboard, multimedia lectures, power point presentation 2- Class discussion 3- Case-based study 4- Handouts 5- Brainstorming 6-Problem solving 7-Role play 8- Evidence-based medicine internet based learning	1- Short MCQs 2- Oral exam and direct questions in the class 3- Midterm exam 4- Electronic exams on the electronic platform 5-Practical exam 6- Final exam
2	2	This lecture aims to develop students' ability to classify heart failure syndromes, understand underlying pathophysiology, recognize clinical manifestations, establish treatment goals, and design evidence-based pharmacologic and	Heart failure		

		nonpharmacologic management plans with appropriate monitoring.			
3	2	This lecture prepares students to identify treatment goals, risk factors, and diagnostic criteria for hypertension, recommend lifestyle and pharmacologic interventions, individualize therapy, and develop monitoring plans to assess blood pressure control and adverse effects.	Hypertension		
4	2	This lecture enables students to understand the pathophysiology and clinical presentation of asthma, define treatment goals, select appropriate pharmacotherapy and delivery devices, develop asthma action plans, and individualize management for different age groups.	Asthma		
5	2	This lecture prepares students to assess patients with COPD, establish treatment goals, design maintenance and exacerbation management plans, implement	COPD		

		monitoring strategies, and provide patient education.			
6	2	This lecture aims to develop students' ability to differentiate types of diabetes, apply diagnostic criteria, establish therapeutic goals, recommend lifestyle and pharmacologic interventions, manage acute complications, and design comprehensive monitoring plans.	DM		
7	2	This lecture aims to enable students to recognize the causes, clinical manifestations, and diagnostic evaluation of anemia and sickle cell disease, develop patient-specific treatment regimens, compare therapeutic options, and design appropriate monitoring plans to assess treatment outcomes.	Anemia		
8	2	This lecture focuses on differentiating ulcer etiologies, selecting appropriate eradication and treatment regimens, managing NSAID-related complications, and	Peptic ulcer		

		developing patient-specific monitoring plans.			
9	2	This lecture aims to familiarize students with the pathophysiology, clinical presentation, causative organisms, treatment goals, and initial management strategies for Meningitis .	Meningitis		
10	2	This lecture enables students to assess tuberculosis risk factors, select appropriate diagnostic tests, design treatment regimens for latent and active disease, monitor therapy effectiveness and safety, and identify patients requiring therapeutic drug monitoring.	Tuberculosis		
11	2	This lecture focuses on diagnosing UTIs, differentiating upper and lower tract infections, selecting appropriate empiric and culture-directed therapy, and developing individualized treatment and monitoring plans.	Urinary tract infection		
12	2	This lecture focuses on identifying risk factors, diagnostic criteria, fracture	Osteoporosis		

		prevention strategies, selecting appropriate therapies, and developing monitoring plans for Osteoporosis .			
13	2	This lecture aims to develop students' ability to understand disease pathophysiology, recognize clinical presentations, establish treatment goals, design pharmacologic and nonpharmacologic treatment plans, and monitor therapy effectiveness and safety for Rheumatoid arthritis .	Rheumatoid arthritis		
14	2	This lecture enables students to identify risk factors, manage acute and chronic gout, select urate-lowering therapy, develop monitoring plans, and counsel patients on lifestyle modifications and prevention strategies for gout.	Gout		
15	2	This lecture is a review of the major points for what have been taken.	Revision		
11. Course Evaluation					
15% Midterm exam, 20% practical , 5% (Quizzes, attendance, active participation in class, assignment), 60 % final exam					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)					

	1- Barbara G.Wells & Joseph T. Diriro, Pharmacotherapy handbook 11th Edition. 2- Chisholm-Burns, Marie A., Patrick M. Malone, Terry L. Schwinghammer, Jill M. Kolesar, Barbara G. Wells, and Joseph T. DiPiro. Pharmacotherapy principles & practice. 6th edition. Roger Walker, Clive Edwards (eds), Clinical Pharmac Therapeutics
Main references (sources)	1- Barbara G.Wells & Joseph T. Diriro, Pharmacotherapy handbook 11th Edition. 2- Chisholm-Burns, Marie A., Patrick M. Malone, Terry L. Schwinghammer, Jill M. Kolesar, Barbara G. Wells, and Joseph T. DiPiro. Pharmacotherapy principles & practice. 6th edition 3. Pharmacotherapy casebook: a patient focused approach,Mcgraw Hill) 4- Roger Walker, Clive Edwards (eds), Clinical Pharmac Therapeutics 6th edition.
Recommended books and references (scientific journals, reports...)	② Journal of Clinical pharmacy and therapeutics
Electronic References, Websites	UpToDate Lexicomp Medscape Drugs.com

Course Description Form

1. Course Name:					
Communication skills					
2. Course Code:					
PH4206					
3. Semester / Year:					
Second semester/ Fourth level					
4. Description Preparation Date:					
2025-2026					
5. Available Attendance Forms:					
Full-time and official attendance hours					
6. Number of Credit Hours (Total) / Number of Units (Total)					
15h*2 =30hrs / 2 unit					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Mohammed kadhém Abid Email: Mohammedk.A.K@alayen.edu.iq					
8. Course Objectives					
Course Objectives		1. Enable the graduating student to communicate effectively with patients and utilize all available means of communication with both patients and physicians throughout the medical treatment process. 2. Empower the graduating student to educate patients regarding medications they are using, including providing them with the gi medication instructions, and overcoming any difficulties or obstacles hindering the delivery of these instructions to them.			
9. Teaching and Learning Strategies					
Strategy		1- Whiteboard, multimedia lectures, power point presentation 2- Class discussion 3- Presentation of cases of ethical dilemmas 4- Handouts 5- Brainstorming 6- Problem solving			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	1. Describe the pharmacist's responsibilities in delivering	Patient-centered communication in pharmacy practice	1- Whiteboard, multimedia lectures,	1- Short MCQs 2- Oral exam and

		patient-centered care. 2. Explain the importance of effective communication in fulfilling patient care responsibilities. 3. Define patient-centered care and its role in pharmacy practice. 4. Understand medication use from the patient's perspective, including beliefs, concerns, and preferences. 5. Promote active patient involvement in therapeutic monitoring and treatment decisions. 6. Describe the medication use process using a patient-centered approach.		power point presentation 2- Class discussion 3- Presentation of cases of ethical dilemmas 4- Handouts 5- Brainstorming 6- Problem solving	direct questions in the class 3- Midterm exam 4- Electronic exams on the electronic platform 5- Final exam 6. Reports and Assignments
2	2	1. Identify the key components of the interpersonal communication model. 2. Describe individual roles and responsibilities within the communication process.	Principles and basics of interpersonal communication		

		3. Explain how meaning is constructed and interpreted during message exchange. 4. Discuss the role of perception and its impact on effective communication.			
3	2	1. Differentiate between verbal and nonverbal communication and explain their roles in effective interaction. 2. Identify key elements of nonverbal communication , including body language, facial expressions, and tone. 3. Recognize distracting nonverbal behaviors that may interfere with clear communication. 4. Interpret nonverbal cues in others to enhance understanding and empathy. 5. Apply appropriate communication strategies when addressing sensitive or difficult issues. 6. Demonstrate techniques to	Nonverbal communication		

		minimize or overcome distracting nonverbal factors during interactions.			
4	2	1. Identify environmental factors that act as barriers to effective communication. 2. Recognize personal barriers that interfere with clear and effective communication. 3. Describe administrative and organizational barriers that impact communication in practice settings. 4. Explain how time constraints can hinder effective communication and patient care.	Barriers to communication		
5	1	1. Demonstrate effective listening skills in professional interactions. 2. Apply empathic responding techniques to support patient understanding and trust. 3. Describe attitudes that underpin	Listen and respond sympathetically during communication		

		empathy, including respect, openness, and nonjudgment. 4. Recognize nonverbal behaviors that convey empathy during communication. 5. Identify common challenges in establishing effective helping relationships and propose strategies to address them.			
6	2	1. Define assertiveness and distinguish it from passive and aggressive communication styles. 2. Explain the theoretical foundations underlying assertive communication. 3. Apply assertiveness techniques in professional interactions. 4. Demonstrate assertive communication when interacting with patients. 5. Use assertiveness effectively when communicating	Assertiveness		

		with other healthcare professionals. 6. Apply assertive skills in interactions with employees and supervisors. 7. Demonstrate assertive communication in relationships with employers and management. 8. • Practice assertiveness in communication with colleagues to promote teamwork and professionalism.			
7	2	1. Identify the key components of an effective interview. 2. Explain interviewing as a structured process in professional practice. 3. Apply interviewing skills in pharmacy practice settings. 4. Utilize interviewing techniques to obtain patient-reported outcomes. 5. Accurately document interview information in a professional	Interview and evaluation		

		and ethical manner. 6. Demonstrate effective interviewing skills using telephone-based communication.			
8	2	1. Identify common misconceptions regarding patient understanding and medication adherence. 2. Apply effective techniques to improve patient understanding of medications and treatment plans. 3. Describe strategies to support the establishment of new health-related behaviors. 4. Utilize approaches that facilitate sustainable behavior change in patients. 5. Explain theoretical models that underpin behavior change in healthcare. 6. Apply motivational interviewing principles and strategies to enhance patient	Helping patients to manage treatment regimens		

		engagement and adherence.			
9	2	1. Identify the essential components of effective patient counseling. 2. Explain the role of patient counseling in promoting safe and effective medication use. 3. Demonstrate appropriate counseling techniques tailored to individual patient needs.	Patient consultation, counseling list, discussion point by point, counseling scenario		
10	2	1. Explain key medication safety concepts and common safety issues in healthcare practice. 2. Identify different types of medication errors, their possible causes, and potential prevention strategies. 3. Describe general approaches to enhance patient safety when medication errors occur, including reporting and system-based solutions.	Medication safety and communication skills	1- Whiteboard, multimedia lectures, power point presentation 2- Class discussion 3- Presentation of cases of ethical dilemmas 4- Handouts 5- Brainstorming 6- Problem solving	1- Short MCQs 2- Oral exam and direct questions in the class 3- Midterm exam 4- Electronic exams on the electronic platform 5- Final exam 6. Reports and Assignments

11	2	1. Adapt communication strategies to effectively interact with older adults. 2. Apply appropriate communication techniques when caring for patients with communication impairments or disabilities. 3. Demonstrate sensitive and compassionate communication with terminally ill patients. 4. Communicate effectively and respectfully with patients living with HIV/AIDS and those with mental health disorders. 5. Identify and apply safe communication approaches when interacting with suicidal patients. 6. Adjust communication methods for patients with low health literacy to improve understanding and adherence. 7. Demonstrate cultural competence in patient	Strategies to manage specific needs		
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		communication across diverse populations. 8. Engage caregivers effectively as partners in patient care and communication.			
12	2	1. Explain the importance of educating children and their parents about medications and safe medication use. 2. Apply a patient-centered communication approach when interacting with pediatric patients and their caregivers. 3. Recognize differences in cognitive development and adapt communication strategies accordingly. 4. Describe general principles for communicating with and empowering infants, toddlers, and preschool children. 5. Adjust communication techniques to effectively engage school-	Communicating with elderly and children about medications		

		age children and adolescents in their care.			
13	2	1. Describe the role of pharmacists in collaborative medication therapy management. 2. Identify common barriers and facilitators that influence effective collaborative partnerships. 3. Outline the initial steps required to establish collaborative practice arrangements. 4. Explain the importance of trust in building and sustaining successful collaborative relationships. 5. Apply effective communication skills to strengthen collaborative professional interactions. 6. Describe critical behaviors essential for effective collaboration within healthcare teams.	Interprofessional communication and collaboration skills		

14	2	1. Describe the role of the Internet and electronic communication in modern healthcare and society. 2. Explain the appropriate use of e-mail in professional and healthcare settings. 3. Discuss patient–provider electronic communication , including benefits, limitations, and best practices. 4. Describe interprofession al electronic communication and its role in collaborative patient care. 5. Identify key issues related to patient privacy, data protection, and system security in electronic communication. 6. Explain legal and liability considerations related to electronic communication and the therapeutic relationship. 7. Describe how electronic communication can be used to	Electronic communication in healthcare.		
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		establish and support pharmaceutical care services. 8. Demonstrate principles of composing, managing, and responding to professional e-mail messages.			
15	2	1. Define medication adherence and health literacy and explain their relevance to patient care. 2. Describe the incidence and prevalence of medication nonadherence and limited health literacy. 3. Explain the clinical, economic, and public health consequences of poor medication adherence and low health literacy. 4. Identify common causes and contributing factors to medication nonadherence and limited health literacy. 5. Describe methods used to assess and measure medication	Medication adherence and health literacy		

		adherence and health literacy. 6. Apply effective strategies and interventions to improve medication adherence and enhance patient health literacy.			
11. Course Evaluation					
20% Midterm exam, 10% (Quizzes, attendance, active participation in class, assignment), 70% final					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Robert S. Beardsley, (ed.); Communication Skills in Pharmacy Practice, the latest edition		
Main references (sources)			-Robert S. Beardsley, (ed.); Communication Skills in Pharmacy Practice, the latest edition -A Handbook for Teaching Courses in Pharmacy Communications.		
Recommended books and references (scientific journals, reports...)			Skills for Communicating with Patients. Th Edition. 2013.		
Electronic References, Websites			Review articles		

Course Description Form

1. Course Name:	
General Toxicology	
2. Course Code:	
PH4204	
3. Semester / Year:	
Second semester /Fourth level	
4. Description Preparation Date:	
2025–2026	
5. Available Attendance Forms:	
Full–time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours/week (theoretical), 2 hours/week (practical), total units = 3	
7. Course administrator's name (mention all, if more than one name)	
Name: Ruaa Yasir Altayeb Email: Ruaa.Yasir@alayen.edu.iq	
8. Course Objectives	
Course Objectives	To study the principle of exposure to different chemicals and environmental factors, their sources, mechanisms of toxicity and their risk to human being; it enables students to understand the required measures to protect living organisms against the suspected toxic hazards.
9. Teaching and Learning Strategies	
Strategy	1. lectures included multimedia lectures 2. power point presentation 3. practical work 4. class activity 5. Self –learning 6. brain storming
10. Course Structure	

Course Structure					
Week	Hrs.	CLOs	Unit/Module or Topic Title	Teaching and Learning Methods	Assessment methods
1	3	– Define important terms in toxicology – Identify classifications of toxicology	Introduction of toxicology	Power point presentation Practical work	Short MCQ Practical exam Midterm exam Final exam
2	2	– Understand types of toxicants – Compare between the different areas in toxicology – Describe spectrum of undesired effects	Basic principles of toxicology		
3	2	– Understand mechanism of liver toxicity by toxicants – Distinguish types of liver injury	Hepatotoxicity		
4	2	– Explain Pathophysiology responses of kidney – Study mechanism of nephrotoxicants	Renal toxicity		
5	2	– Identify acute response of lungs to injury – Identify types of chronic respiratory toxic response	Toxicity of respiratory system		

6	2	–Describe toxicant effects on the nervous system –explain mechanism of neurotoxicity and examples of neurotoxicants	Toxicity of nervous system		
7	2	–Study effects of xenobiotics on erythrocytes –Understand alterations in the respiratory function of hemoglobin	Blood toxicity		
8	2	–Classify pesticides according to their use –Explain mechanism of toxicity	Pesticides		
9	2	–Describe toxic effects of metals –Apply drugs in treatment of metals intoxication	Metals toxicity		
10	2	–Classify food additives and contaminants –Apply therapeutic drugs for food poisoning	Food contaminants		
11	2	–Identify common poisonous plants –Understand management of plant poisoned patients	Plants toxicity		

12	2	–Explain mechanisms of air pollutants –Describe clinical effects	Air pollution		
13	2	–Describe health effects of particulate matter –Define SMOG and acid rain	Environmental pollutants		
14	3	–Describe mechanism of chemical carcinogenesis	carcinogenesis		
15	2	–Identify steps of mutagenesis	Mutagenesis		

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	–Casarett & Doull's Toxicology: The Basic Science of Poisons by Curtis D. Klaassen, 10th Edition –Poisoning and drug overdose, 8 th edition
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	● www.pubmed.com ● www.biomed.net ● www.ncbi.nlm.nih.gov

Course Description Form

1. Course Name:	
Industrial pharmacy I	
2. Course Code:	
PH4205	
3. Semester / Year:	
Second semester/ fourth year	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 hours/week (theoretical), 2 hours/week (practical), total units = 4	
7. Course administrator's name (mention all, if more than one name)	
Name: Lecturer Dr. Samer Khalid Ali	
Email: Samer.ali@alayer.edu.iq	
8. Course Objectives	
Course Objectives	The subjective aim of this course is to teach pharmacy students the steps and lines upon which the preformulating processing of pharmaceutical dosage forms. This fundamental course provides the required principles to integrate knowledge of pharmaceutical technology in preformulating of perfect dosage form. It includes milling, mixing, drying and filtration, besides sterilization to achieve a proper processing of dosage forms. Characterization, solubility and stability analysis
9. Teaching and Learning Strategies	
Strategy	Lectures and Presentation, Interactive discussions related photos and videos, brainstorm, and Inverted classrooms with learning strategies
10. Course Structure (Theory)	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Understand the Principles of Pharmaceutical Processing: mixing	fluid mixing; Flow characteristics. mechanisms of mixing; mixing equipment. batch and continuous mixing	smartboard/ Presentation slides/ discussion	oral questions and written exams
2	3	Knowledge of the mixer and best selection of mixer	batch and continuous mixing; mixer selection.	smartboard/ Presentation slides/ discussion	oral questions and written exams
3	3	Describe the Milling	pharmaceutical application of milling; size distribution and measurement; Theory of comminution	smartboard/ Presentation slides/ discussion	oral questions and written exams
4	3	Understand types of mills	types of mills; factors influencing milling; selection of mills techniques and techniques of	smartboard/ Presentation slides/ discussion	oral questions and written exams

			milling		
5	3	Understand Drying industrial process	Definition of drying; purpose; Psychrometry (Humidity measurement); theory of drying; drying of solids	smartboard/ Presentation slides/ discussion	oral questions and written exams
6	3	Define drying equipment's	classification of dryer; specialized drying methods	smartboard/ Presentation slides/ discussion	oral questions and written exams
7	3	Understand process of Clarification and filtration	Theory; filter media; filter aids; selection of drying method; non-sterile and sterile operations: integrity testing	smartboard/ Presentation slides/ discussion	oral questions and written exams
8	3	Understand the equipment's and systems (Commercial and laboratory) of filtration.	equipment and systems (Commercial and laboratory) of filtration	smartboard/ Presentation slides/ discussion	oral questions and written exams
9	3	Describe Sterilization; validation of	Sterilization; validation of methods; microbial death	smartboard/ Presentation slides/	oral questions

		methods; microbial death kinetics	kinetics	discussion	and written exams
10	3	To understand Methods of sterilization	Methods of sterilization (Thermal and non- thermal); mechanisms; evaluation	smartboard/ Presentation slides/ discussion	oral questions and written exams
11	3	To understand effect of route of administration	Sterile Products; effect of route of administration	smartboard/ Presentation Slides /discussion	oral questions and written exams
12	3	Describe Formulations of ophthalmic preparations and Effect of Added Substances	Formulations; ophthalmic preparations Formulation development ; Added Substances (Sterile Products)	smartboard/ Presentation slides/ discussion	oral questions and written exams
13	3	Describe the types of containers	Containers; Plastic Containers Glass Containers (Sterile Products)	smartboard/ Presentation Slides /discussion	oral questions and written exams
14	3	Describe the Types of tests used in Quality Control	Production; Quality Control (Sterile Products)	smartboard/ Presentation slides/ discussion	oral questions and written exams

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	The Theory and practice of industrial pharmacy.”, Leon Lachman, 2009
Main references (sources)	1–Aulton's Pharmaceutics: The Design and Manufacture of Medicines, Third Edition, Michael E. Aulton (Author) Churchill, Livingstone–Elsevier 2–Ansel's Pharmaceutical dosage forms and drug delivery systems, tenth edition 2014.
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Organic pharmaceutical chemistry II	
2. Course Code:	
PH4 101	
3. Semester / Year:	
First semester / fourth level	
4. Description Preparation Date:	
2025–2026	
5. Available Attendance Forms:	
Full–time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3x15= 45 hrs (theoretical) 2x15=30 hrs (practical) /number of units = 4	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Sarmad Dheyaa Noori Email: sarmed.noori@alayen.edu.iq	
8. Course Objectives	
Course Objectives	This course offers an in–depth exploration of the pharmaceutical chemistry and pharmacology of major drug classes that target key physiological systems. The curriculum focuses on the relationship between chemical structure and biological activity (SAR), the mechanism of action at specific receptors, and the therapeutic applications of these agents in treating various diseases.
9. Teaching and Learning Strategies	
Strategy	1–lectures included multimedia lectures 2– power point presentation 3– practical work 4– open discussion 5– class activity 6–Self learning

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Cholinergic agents	Cholinergic agents, cholinergic receptors and their subtype	1–lectures included multimedia	1–written exam 2– Quiz 3–midterm exam 4– final exam
2–3	5	Cholinergic agents	Cholinergic agonists; stereochemistry and SAR; products; cholinesterase inhibitors	lectures 2– power point presentation	
3–4	5	Cholinergic agents	Cholinergic blocking agents; SAR; solanaceous alkaloid and analogues; synthetic cholinergic blocking agents and products; ganglionic blocking agents (neuromuscular blocking agents).	on 3– open discussion 5– class activity 6–Self learning	
5–7	9	Adrenergic agents	Adrenergic agents (adrenergic neurotransmitters), adrenergic receptor; drugs affecting adrenergic neurotransmission; sympathomimetic agents, adrenergic receptor antagonists		
8–9	5	CNS depressant	CNS depressant; benzodiazepines and related compounds; barbiturate; CNS		

			depressant with skeletal muscle relaxant properties; antipsychotics; anticonvulsants		
10	2	CNS stimulants	Central sympathomimetic agents Antidepressants		
11–12	5	Drugs affecting cardiovascular system	Drugs affecting the Renin Angiotensin pathway and calcium blockers, vasodilators		
12–14	7	Histamine and anti-histaminic agents	Structure–activity relationships at H1–receptors; first–generation antihistamine classes; second–generation antihistamines; recent antihistamine developments: the “dual–acting” antihistamines; histamine H2–antagonists: structural derivation of the “H2–antagonists		
14–15	5	NSAIDs	Cyclooxygenases; Therapeutic Classifications; SAR.		

11. Course Evaluation

Written exam 60 marks

Midterm 20 marks

Practical 20 marks

Total =100 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Foye's Principles of Medicinal Chemistry Roche PhD (Author), S. William PhD Zito 7 th Edition PhD by Victoria PhD F. , College of Pharmacy, Houston Uni, Texas, USA.
Main references (sources)	Wilson and Gisvolds textbook of organic medicinal and pharmaceutical chemistry, John M. B.; John H.B. (twelfth edition).
Recommended books and references (scientific journals, reports...)	An Introduction to Medicinal Chemistry Edition by Graham L. Patrick, University of West of Scotland, UK
Electronic References, Websites	Websites of Arab and universities and pharmaceutical companies

Course Description Form

1. Course Name:	
Organic Pharmaceutical chemistry III	
2. Course Code:	
PH4 204	
3. Semester / Year:	
Second semester/ Fourth level	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3x15= 45 hrs (theoretical) 2x15=30 hrs (practical) /number of units = 4	
7. Course administrator's name (mention all, if more than one name)	
Name: Sarmad Dheyaa Noori Email: sarmed.noori@alayen.edu.iq	
8. Course Objectives	
Course Objectives	- This course covers the medicinal chemistry and pharmacology of chemotherapeutic drugs. It details the mechanisms of anticancer agents, from traditional antineoplastics to modern biotherapeutics. - The curriculum also provides an in-depth analysis of major antibacterial classes (including β-lactams and sulfonamides) and concludes with an overview of antiviral and antifungal agents.
9. Teaching and Learning Strategies	
Strategy	1-lectures included multimedia lectures 2- power point presentation 3- practical work 4- open discussion 5- class activity 6-Self learning

		7– Brain storming 8– Role play			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1–5	15	Anticancer agent	Antineoplastic agents: alkylating agents; antimetabolites; antibiotics; plants products; miscellaneous compounds	1–lectures included	1–Assignment
				multimedia lectures	2– Quiz
				2– power point presentation	3–midterm exam
6–7	5		Hormones and related compounds; Future anti-neoplastic agents; Monoclonal antibodies; Gene therapy of cancer.	3– practical work 4– open discussion 5– class activity 6–Self learning 7– Brain storming 8– Role play	4– Practical exam 5– final exam
8–10	9	Antibacterial	β – lactam antibiotics(penicillins); β – lactamase inhibitors; cephalosporins and monobactams		
11–12	6		Aminoglycosides and chloramphenicol; tetracyclines; macrolides; Lincomycins and polypeptides patterns,		
13	3		Sulfonamide:chemistry, nomenclature, mechanism of action, resistance, toxicity, side effect,		

			metabolism protein binding, distribution and SAR) products, sulfones		
14–15	5	Antiviral	Agents Inhibiting Virus Attachment, Penetration, and Early; Agents Interfering with Viral Nucleic Acid Replication; HIV Protease Inhibitors; HIV Reverse Transcriptase Inhibitors; HIV Integrase Inhibitors; Investigational Antiviral Agents		
15	2	Antifungal	Biochemical targets for antifungal chemotherapy; Polyene Membrane Disruptors; Ergosterol Biosynthesis Inhibitors; Inhibitors of Cell Wall Biosynthesis—Echinocandins; miscellaneous drugs.		

11. Course Evaluation

Written exam 60 marks

Midterm 20 marks

Practical exam 20 marks

Total =100 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Foye's Principles of Medicinal Chemistry Rodriguez et al. 8th Edition PhD (Author), S. William PhD Zito 7 th Edition P
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	by Victoria PhD F. , College of Pharmacy, Houston Uni, Texas, USA.
Main references (sources)	Wilson and Gisvolds textbook of organic medicine and pharmaceutical chemistry, John M. B.; John H.B. (twelfth edition).
Recommended books and references (scientific journals, reports...)	Foye's Principles of Medicinal Chemistry Roche PhD (Author), S. William PhD Zito 7 th Edition Prepared by Victoria PhD F. , College of Pharmacy, Houston Uni, Texas, USA. Wilson and Gisvolds textbook of organic medicine and pharmaceutical chemistry, John M. B.; John H.B. (twelfth edition). An Introduction to Medicinal Chemistry 7th Edition by Graham L. Patrick, University of the West of Scotland, UK
Electronic References, Websites	Websites of Arab and universities and pharmaceutical companies

Course Description Form

1. Course Name:	
Pharmacology III	
2. Course Code:	
PH4201	
3. Semester / Year:	
Fourth year second semester	
4. Description Preparation Date:	
2026–205	
5. Available Attendance Forms:	
Full–time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total):	
2 hr x 15 weeks= 30 hr	
7. Course administrator's name (mention all, if more than one name)	
Name: Karema mohamed Abuelfotouh soliman	
Email: Karema.mohammed@alayen.edu.eg	
8. Course Objectives	
Course Objectives	The aims of the course are to provide students with the basics of pharmacology of the commonly used groups of drugs affecting the endocrine system regarding their pharmacological actions, uses, adverse effects, contraindications and pharmacokinetics. Moreover, to gain knowledge about the different classes of chemotherapeutic agents concerning their pharmacological actions, uses, adverse effects, contraindications and pharmacokinetics. In addition to, the basics of pharmacology of the anti–inflammatory, analgesics and gout treatments and stem cell therapy. The course also enables the students to select the treatment regimen using comprehensive scientific knowledge of etiology and pathophysiology of disease as well as write safe prescriptions for selected common and important diseases.
9. Teaching and Learning Strategies	
Strategy	1–lectures included multimedia lectures

2– power point presentation

3– open discussion

4– class activity

5– brain storming

6– problem solving

- Interactive lectures to explain mechanisms of action, therapeutic uses, and adverse effects of drugs.
- Case-based learning to link pharmacological principles with clinical scenarios.
- Problem-based learning (PBL) to enhance critical thinking and rational drug selection.
- Use of charts, drug classification tables, and flow diagrams to simplify complex drug actions.
- Small-group discussions to compare drugs within the same class.
- Practical sessions focusing on prescription writing and dose calculations.
- Student presentations on selected drug classes to reinforce active learning.
- Formative assessments (quizzes, MCQs) to provide continuous feedback.
- Use of e-learning platforms and digital resources for self-directed learning.

10. Course Structure

Week	Hrs.	CLOs	Unit/Module or Topic Title	Teaching and Learning Methods	Assessment methods
1.	2	□ Identify anterior and posterior pituitary hormones and understand their physiological roles. □ Classify pituitary agonists and antagonists and explain their therapeutic uses.	Drugs of pituitary gland	1–lectures included multimedia lectures 2– power point presentation 3– open	1– Oral exam and direct questions in the class

2.	2	□ Classify different insulin preparations and explain their mechanisms of action. □ Describe adverse effects, drug interactions, and select appropriate therapy for type 2 diabetes.	Antidiabetic drugs (insulin)	discussion 4– class activity 5– brain storming 6– problem solving	1– Oral exam and direct questions in the class
3.	2	□ Classify oral hypoglycemic agents and explain their mechanisms of action. □ Identify adverse effects and drug interactions and select appropriate therapy for type 2 diabetes.	Oral hypoglycemic agents		1– Short MCQs 2– Oral exam and direct questions in the class
4.	2	□ Classify corticosteroids and catecholamines and explain their physiological and pharmacological effects. □ Describe therapeutic uses, adverse effects, and contraindications.	Drugs of adrenal gland		1– Oral exam and direct questions in the class
5.	2	□ Apply gonadal hormones and inhibitors in the management of reproductive disorders. □ Identify therapeutic indications, limitations, and potential adverse	The gonadal hormones and inhibitors		1– Short MCQs

		effects.			
6.	2	□ Define autacoids, classify their types, and explain their physiological roles. □ Describe mechanisms and therapeutic uses of autacoid antagonists.	Autacoids and autacoid antagonists		2– Oral exam and direct questions in the class
7.	2	□ Classify NSAIDs and anti-inflammatory agents and explain cyclooxygenase enzyme inhibition. □ Compare selective and non-selective NSAIDs and describe therapeutic uses.	NSAIDs and other anti inflammatory agents		1– Short MCQs 2– Oral exam and direct questions in the class
8.	2	□ Identify drugs used in erectile dysfunction and explain the mechanisms of phosphodiesterase inhibitors. □ Describe therapeutic uses, contraindications, and adverse effects.	Drugs used in erejctile dysfunction		2– Oral exam and direct questions in the class
9.	2	□ Compare anabolic and antiresorptive agents and apply drugs in osteoporosis management. □ Describe therapeutic indications, limitations, and potential adverse effects.	Drugs used in osteoporosis		1– Short MCQs

10.	2	□ Evaluate pharmacotherapy as part of weight management and explain selective mechanisms of action. □ Describe adverse effects, limitations, and combination therapy considerations.	Drugs used in the management of obesity		1– Oral exam and direct questions in the class
11	2	□ Describe mechanisms of action, therapeutic uses, and limitations of anticancer drugs. □ Recognize adverse effects, dose-limiting toxicities, and supportive care needs.	Cancer chemotherapy		1– Short MCQs
12	2	□ Apply anticancer drugs in treatment protocols and combination therapy. □ Monitor patients for toxicity and provide guidance on supportive care.	Anticancer drugs		1– Oral exam and direct questions in the class
13	2	□ Describe therapeutic uses of immunosuppressants in transplantation and autoimmune diseases. □ Identify adverse effects and infection risks and apply these drugs safely.	Immunosuppressants		1– Oral exam and direct questions in the class
14	2	□ Apply drugs in hypo- and hyperthyroidism and	Hormones of the thyroid gland		2– Oral exam and direct questions in the class

		monitor therapy for effectiveness and toxicity. □ Recognize adverse effects and manage complications.			
15	2	□ Explain mechanisms of iron, vitamin B12, folic acid, and erythropoietin. □ Apply appropriate therapy based on anemia type and monitor for safety and efficacy	Drugs for anemia		1– Short MCQs 2– Oral exam and direct questions in the class

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1- Lippincott s illustrated reviews. 3rd edition Richard D. HOWLAND, Mary J Mycek 2- Katzung s pharmacology: Examination and board review 6 thedition Anthony J Trevor, Bertram G Katzung, Susan B Masters.
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Goodman and Gillman 2012
Electronic References, Websites	● www.google.com ● www.pubmed.com ● www.biomed.net

Course Description Form

1. Course Name:	
Pharmacology II	
2. Course Code:	
PH4101	
3. Semester / Year:	
First semester /Fourth year	
4. Description Preparation Date:	
2025–2026	
5. Available Attendance Forms:	
Full–time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 hours/week (theoretical), 2 hours/week (practical), total units = 4	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Ahmed Atwa Email: ahmed–atwa@eru.edu.eg	
8. Course Objectives	
Course Objectives	Building on the knowledge and skills obtained in Pharmacology I, this course will aim to ensure that students gain knowledge and understanding of the basic principles of cardiovascular and CNS acting drugs together with diuretics, lipid lowering drugs, common groups of drugs affecting gastrointestinal, and respiratory system regarding their pharmacological actions, uses, adverse effects, and contraindications. Also to ensure that students relate the misuse of centrally acting drugs and addiction.
9. Teaching and Learning Strategies	
Strategy	1) Lectures including multimedia lectures 2) Power point presentation 3) Open discussion 4) Class activity 5) Brain storming 6) Problem solving

7) Practical work

8) Case studies

10. Course Structure

Theory Course Structure

Week	Hrs.	CLOs	Unit/Module or Topic Title	Teaching and Learning Methods	Assessment methods
1.	2	To introduce the pharmacy students to the general pharmacology of the central nervous system and to the various drug groups used in the treatment of CNS diseases or drugs altering its function.	Introduction to nervous system	1-lectures including multimedia lectures 2- power point presentation 3- open discussion 4- class activity 5- brain storming	1- Oral exam and direct questions in the class 2- Short MCQs 3- Case study
2.	3	To introduce pharmacy students to the various drug groups used as CNS stimulants	CNS stimulants.	6- problem solving 7- case studies	1- Oral exam and direct questions in the class 2- Short MCQs 3- Case study
3.	3	To introduce pharmacy students to the various drug groups used as anxiolytics and hypnotics	Anxiolytic and Hypnotic drugs		1- Oral exam and direct questions in the class 2- Short MCQs 3- Case study
4.	3	To introduce pharmacy students to the various drug groups used as general and local anesthetics	General and Local Anesthetics.		1- Oral exam and direct questions in the class 2- Short MCQs 3- Case study

5.	3	To introduce pharmacy students to the various drug groups used as antidepressant drugs	Antidepressant drugs		1- Oral exam and direct questions in the class 2- Short MCQs 3- Case study
6.	3	To introduce pharmacy students to the various drug groups used as antipsychotic drugs	Antipsychotic (neuroleptic) drugs.		1- Oral exam and direct questions in the class 2- Short MCQs 3- Case study
7.	2	To introduce pharmacy students to the various drug groups used as antiemetic drugs and GIT diseases.	Gastrointestinal and antiemetic drugs.		1- Oral exam and direct questions in the class 2- Short MCQs 3- Case study
8.	3	To introduce pharmacy students to the various drug groups used as opioid analgesics and antagonists	Opioid analgesics and antagonists.		1- Oral exam and direct questions in the class 2- Short MCQs 3- Case study
9.	3 2	To introduce pharmacy students to the various drug groups used in treatment of neurodegenerative diseases and various drug groups used as diuretics	Treatment of neurodegenerative diseases. Diuretics		1- Oral exam and direct questions in the class 2- Short MCQs 3- Case study
10.	2	To introduce pharmacy students to the various drug groups used as antiepileptic drugs	Antiepileptic Drugs.		1- Oral exam and direct questions in the class 2- Short MCQs 3- Case study
11	2	To introduce pharmacy students to the various	The treatment of heart failure (HF).		1- Oral exam and direct questions in the class 2- Short MCQs

		drug groups used in treatment of heart failure	Antihyperlipidemic drugs.		3- Case study
12	2	To introduce pharmacy students to the various drug groups used in treatment of arrhythmia	Antiarrhythmic drugs.		1- Oral exam and direct questions in the class 2- Short MCQs 3- Case study
13	3	To introduce pharmacy students to the various drug groups used in treatment of angina	Antianginal Drugs.		1- Oral exam and direct questions in the class 2- Short MCQs 3- Case study
14	3	To introduce pharmacy students to the various drug groups used in treatment of hypertension	Antihypertensive drugs.		1- Oral exam and direct questions in the class 2- Short MCQs 3- Case study
15	3 3	To introduce pharmacy students to the various drug groups affecting the blood and used in treatment of respiratory diseases	Drugs affecting the blood, Drugs acting on the respiratory system.		1- Oral exam and direct questions in the class 2- Short MCQs 3- Case study

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

15 points for the mid term

5 points for the daily preparation or exams

20 points for the lab

60 points for the final theoretical exam

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1- <u>Whalen, K. (2018). Lippincott® Illustrated Reviews: Pharmacology. Wolters kluwer india Pvt Ltd.</u> 2- <u>Trevor, A. J., Katzung, B. G., Masters, S. B., & Kruidering-Hall, M. (2010).</u>
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	<u>Pharmacology examination & board review</u> (pp. 121–132). New York: <u>McGraw–Hill Medical</u> .
Main references (sources)	
Recommended books and references (scientific journals, reports...)	<u>Rang, H. P., Dale, M. M., Ritter, J. M., Flower, R. J., & Henderson, G. (2011). <i>Rang & Dale's pharmacology</i>. Elsevier Health Sciences.</u> <u>Brunton, L. L., Hilal-Dandan, R., & Knollmann, B. C. (2018). <i>As Bases Farmacológicas da Terapêutica de Goodman e Gilman–13</i>. Artmed Editora.</u>
Electronic References, Websites	• <u>www.google.com</u> • <u>www.pubmed.com</u> • <u>www.biomed.net</u> • <u>www.ncbi.nlm.nih.gov</u> • <u>Jornal of Pharmacology and experimer therapeutics.</u>



Course Description Form

1. Course Name:					
Therapeutic Drug Monitoring					
2. Course Code:					
TDM/ PH5203					
3. Semester / Year:					
2 nd semester / 5 th stage					
4. Description Preparation Date:					
2025-2026					
5. Available Attendance Forms:					
Full-time and official attendance hours					
6. Number of Credit Hours (Total) / Number of Units (Total)					
30hrs theoretical / 2 units					
30hrs Practical / 1 unit					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Amira Amin					
Email: Amiramin@alayen.edu.iq					
8. Course Objectives					
Course Objectives	1. The current course enables students to learn how to select the most appropriate medications for individuals, recommend dosage regimens likely to achieve the desired therapeutic response with minimal risk of adverse effects and monitor drug effects if appropriate. 2. Students will apply clinical pharmacokinetic principles, which are essential for current clinical pharmacy practice and may become even more important with the expansion of pharmacists' roles in medication prescribing.				
9. Teaching and Learning Strategies					
Strategy	1- Whiteboard, multimedia lectures, power point presentation 2- Class discussion 3- Case-based study 4- Handouts 5- Brainstorming 6- Problem solving 7- Case simulation in lab 8- Web site Internet evidence-based learning 9- Role play 10- Flipped learning class				
10. Course Structure for theory					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	2	1. Explain the goals and clinical importance of therapeutic drug monitoring (TDM). 2. Discuss the need for therapeutic drug monitoring in optimizing drug efficacy and minimizing toxicity. 3. Identify the four principal biological processes of pharmacokinetics, including absorption, distribution, metabolism, and elimination. 4. Identify the major routes of drug elimination from the body. 5. Define key pharmacokinetic terms, including: • Therapeutic drug monitoring (TDM) • Linear and nonlinear pharmacokinetics • Pharmacokinetic parameters • Half-life • Volume of distribution • Clearance	Review of basic pharmacokinetic (PK) and pharmacodynamic	1- Whiteboard, multimedia lectures, power point presentation 2- Class discussion 3- Case-based study 4- Handouts 5- Brainstorming 6- Problem solving 7- Role play 8- Evidence-based medicine internet based learning	1- Short MCQs 2- Oral exam and direct questions in the class 3- Midterm exam 4- Electronic exams on the electronic platform 5- Practical exam 6- Final exam
2	2	1. Explain and apply pharmacokinetic equations used to estimate drug concentrations in the body. 2. Apply relevant equations to calculate individualized	Clinical PK equations and calculations		

		pharmacokinetic parameters, such as clearance, volume of distribution, and half-life. 3. Use pharmacokinetic equations to determine appropriate maintenance doses and loading doses based on patient-specific data.			
3	2	1. Discuss the impact of renal, hepatic, and cardiac diseases on drug pharmacokinetics, including absorption, distribution, metabolism, and elimination. 2. Explain the effects of obesity on drug pharmacokinetics and dosing considerations.	Clinical PK in special population kidney failure and cases		
4	2	1. Discuss the impact of renal, hepatic, and cardiac diseases on drug pharmacokinetics, including absorption, distribution, metabolism, and elimination. 2. Explain the effects of obesity on drug pharmacokinetics and dosing considerations.	Clinical PK in special population and cases		
5	2	1. Explain the rationale for monitoring aminoglycoside serum	Clinical PK/PD for Aminoglycosides		

		concentrations, including efficacy optimization and toxicity prevention. 2. Apply appropriate pharmacokinetic methods and equations to calculate the initial aminoglycoside dose. 3. Use individualized pharmacokinetic parameters and equations to adjust and individualize aminoglycoside dosing regimens.			
6	2	1. Explain the rationale for monitoring vancomycin serum concentrations, including optimization of therapeutic efficacy and minimization of toxicity. 2. Apply appropriate pharmacokinetic methods and equations to calculate the initial vancomycin dosing regimen. 3. Use individualized pharmacokinetic parameters and equations to adjust and optimize vancomycin dosing for individual patients.	Clinical PK/PD for Vancomycin		
7	2	1. Explain the need for monitoring digoxin serum concentrations, including its narrow	Clinical PK/PD for Digoxin		

		therapeutic index and risk of toxicity. 2. Apply appropriate pharmacokinetic methods and equations to calculate the initial digoxin dose. 3. Use individualized pharmacokinetic parameters and equations to adjust and optimize digoxin dosing for individual patients.			
8	2	1. Explain the need for monitoring phenytoin serum concentrations, including its narrow therapeutic index and nonlinear pharmacokinetics. 2. Apply appropriate pharmacokinetic methods and equations to calculate the initial phenytoin dose. 3. Use individualized pharmacokinetic parameters and equations to adjust and optimize phenytoin dosing for individual patients.	Clinical PK/PD for Phenytoin		
9	2	1. Explain the pharmacokinetic and pharmacodynamic characteristics of Carbamazepine. 2. Identify factors affecting serum concentrations, including autoinduction, protein binding, and drug interactions.	Clinical PK/PD for other Anticonvulsants (e.g., Carbamazepine,		

		3. Apply basic PK principles to dose selection, monitoring, and dose adjustment for these agents.			
10	2	1. Explain the pharmacokinetic and pharmacodynamic characteristics of Valproic Acid. 2. Identify factors affecting serum concentrations, including autoinduction, protein binding, and drug interactions. 3. Apply basic PK principles to dose selection, monitoring, and dose adjustment for these agents.	Valproic Acid, Phenobarbitone/Primidone, Ethosuximide		
11	2	1. Describe the pharmacokinetic and pharmacodynamic properties of theophylline. 2. Explain the need for therapeutic drug monitoring due to narrow therapeutic index and variable clearance. 3. Apply pharmacokinetic equations to calculate initial and adjusted theophylline dosing.	Clinical PK/PD for Theophylline		
12	2	1. Explain the pharmacokinetic and pharmacodynamic	Clinical PK/PD for Immunosuppressants (e.g., Cyclosporine, Tacrolimus)		

		profiles of cyclosporine and tacrolimus. 2. Identify factors influencing drug exposure, including organ function, drug interactions, and formulation differences. 3. Apply therapeutic drug monitoring principles to optimize efficacy and minimize toxicity.			
13	2	1. Describe the pharmacokinetic and pharmacodynamic properties of selected antiarrhythmic agents. 2. Explain the role of active metabolites in therapeutic response and toxicity. 3. Apply pharmacokinetic principles to dosing and monitoring in acute and chronic therapy.	Clinical PK/PD for other Cardiovascular agents (e.g., Lidocaine, Procainamide/N-Acetyl Procainamide)		
14	2	1. Explain the pharmacokinetic and pharmacodynamic characteristics of selected high-risk medications. 2. Recognize the need for drug monitoring based on narrow therapeutic index and patient variability.	Clinical PK/PD of other drugs (e.g., Lithium), Anticancer agents, and Anticoagulants		

		3. Apply individualized dosing principles to improve safety and therapeutic outcomes.			
15	2	1. Review and reinforce key pharmacokinetic and pharmacodynamic concepts. 2. Apply PK/PD principles to clinical case scenarios involving drug dosing and monitoring. 3. Integrate basic and applied pharmacokinetics to support rational therapeutic decision-making.	Revision of basic and applied pharmacokinetic (PK) and pharmacodynamic		

11. Course Evaluation

15% Midterm exam, 20% practical , 5% (Quizzes, attendance, active participation in class, assignment), 60 % final exam

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Applied Clinical Pharmacokinetics, latest Edition, by Larry A. Bauer. Additional references include but not limited to the following: Clinical Pharmacokinetics Concepts and Applications, latest Edition, by Malcolm Rowland and Thomas Tozer.
Main references (sources)	Applied Clinical Pharmacokinetics, latest Edition, by Larry A. Bauer. Additional references include but not limited to the following: Clinical Pharmacokinetics Concepts and Applications, latest Edition, by Malcolm Rowland
Recommended books and references (scientific journals, reports...)	• Journal of Pharmacokinetics and Pharmacodynamics • International Journal of Pharmacokinetics • Journal of Pharmacokinetics and Biopharmaceutics
Electronic References, Websites	UpToDate

	Glopal RPH Clinical Cal calculator Lexicomp Medscape Drugs.com
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Course Description Form

1. Course Name:					
Applied therapeutic II					
2. Course Code:					
PH5202					
3. Semester / Year:					
2 nd semester / 5 th stage					
4. Description Preparation Date:					
2025–2026					
5. Available Attendance Forms:					
Full-time and official attendance hours					
6. Number of Credit Hours (Total) / Number of Units (Total)					
30hrs / 2 units					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Fahmi Yahya Ahmed Email: Fahmi.yahya@alayen.edu.iq					
8. Course Objectives					
Course Objectives	1. Identify the basic principles of pharmaceutical care for the diseases taken in the course. 2. Describe the different classes of medications, therapeutic uses, and doses used to treat the diseases taught in this course. 3. Critically evaluate clinical data, taking into account factors such as patient history, disease state, and treatment options to optimize drug therapy and patient outcomes. 4. Utilize current evidence-based guidelines to guide treatment decision-making and adapt to evolving medical practices. 5. To be able to communicate with the patient and the medical staff during the treatment stages. 6. To be able to educate the patient regarding the medications given to them.				
9. Teaching and Learning Strategies					
Strategy	1- Whiteboard, multimedia lectures, power point presentation 2- Class discussion 3- Case-based study 4- Handouts 5- Brainstorming 6- Problem solving				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	1. Explain the regulation and physiologic functions of hormones	Adrenal gland disorders	1- Whiteboard, multimedia	1- Short MCQs 2- Oral

		produced by the adrenal glands. 2. Recognize the clinical features of acute and chronic adrenal insufficiency. 3. Describe pharmacologic management strategies for adrenal insufficiency. 4. Identify appropriate monitoring parameters for therapy in adrenal insufficiency. 5. Recognize the clinical manifestations and consequences of cortisol excess in Cushing syndrome. 6. Describe pharmacologic and nonpharmacologic treatment options for Cushing syndrome. 7. Recommend strategies to prevent hypo- and hypercortisolism. 8. Identify monitoring parameters to assess treatment effectiveness and safety in Cushing syndrome.		lectures, power point presentation 2- Class discussion 3- Case-based study 4- Handouts 5- Brainstorming 6-Problem solving	exam and direct questions in the class 3- Midterm exam 4- Electronic exams on the electronic platform 5- Final exam 6. Reports and Assignments
2	2	1. Explain the components and regulation of the hypothalamic–pituitary–thyroid axis. 2. Interpret serum TSH levels in primary thyroid disorders and explain their clinical advantage over T3 and T4 measurements. 3. Recognize the clinical features and consequences of untreated or inadequately treated hypothyroidism.	Thyroid gland disorders		

		4. Describe the clinical use of levothyroxine in the management of hypothyroidism, including dosing and administration considerations. 5. Explain issues related to levothyroxine bioequivalence and the importance of maintaining patients on the same product. 6. Describe the management of thyroid disorders in special populations, including pregnant women. 7. Recognize the signs and consequences of hyperthyroidism. 8. Discuss pharmacologic treatment options for hyperthyroidism, including antithyroid drugs and radioactive iodine, with attention to benefits, risks, adverse effects, and monitoring.			
3	2	1. Explain the pathophysiology of Alzheimer's disease, including genetic and environmental contributing factors. 2. Recognize the typical clinical presentation of patients with Alzheimer's disease. 3. Describe the integration of nonpharmacologic and pharmacologic therapies in the management of Alzheimer's disease. 4. Identify and recommend treatment options for cognitive	Alzheimer disease		

		symptoms and behavioral/noncognitive manifestations of Alzheimer's disease. 5. Provide education to patients and caregivers regarding expected disease outcomes and available support and advocacy resources.			
4	2	1. Explain the underlying pathophysiological mechanisms of anxiety disorders. 2. Recognize common clinical manifestations of generalized anxiety disorder (GAD). 3. Define therapeutic goals for the management of patients with GAD. 4. Identify appropriate lifestyle modifications and suitable over-the-counter options for patients with anxiety disorders. 5. Design patient-specific pharmacotherapy plans for the treatment of anxiety disorders. 6. Develop a monitoring plan to assess treatment effectiveness and detect adverse effects.	Generalized anxiety disorder		
5	2	1. Explain the etiology and pathophysiology of major depressive disorder. 2. Recognize the clinical signs and symptoms of major depressive disorder. 3. Define therapeutic goals for patients with	Depression		

		major depressive disorder. 4. Select appropriate antidepressant pharmacotherapy based on patient-specific characteristics. 5. Develop a monitoring plan to assess treatment efficacy and identify adverse effects. 6. Educate patients and caregivers on the appropriate use of antidepressant medications and the importance of adherence.			
6	2	1. Recognize the common signs and symptoms of schizophrenia. 2. Explain the proposed pathophysiological mechanisms underlying schizophrenia. 3. Define therapeutic goals for the management of patients with schizophrenia. 4. Select appropriate antipsychotic therapy based on patient-specific factors. 5. Compare the adverse effect profiles of commonly used antipsychotic medications. 6. Educate patients and their families about schizophrenia, available treatments, and the importance of medication adherence.	Schizophrenia		
7	2	1. Explain the pathophysiology and	Insomnia and sleep disorders		

		key clinical features of insomnia. 2. Recommend and optimize sleep hygiene measures and nonpharmacologic therapies for the prevention and management of insomnia. 3. Select and optimize appropriate pharmacologic therapy for patients with insomnia. 4. Apply the patient care process to evaluate the safety and effectiveness of insomnia pharmacotherapy.			
8	2	1. Explain the physiology of the female reproductive system relevant to contraception. 2. Compare the effectiveness of oral contraceptives with other contraceptive methods. 3. Describe the mechanisms of action of hormonal contraceptives. 4. Identify adverse effects, risks, and contraindications of contraceptive use and recommend strategies to reduce these risks. 5. Compare the advantages and disadvantages of oral and nonoral contraceptive methods. 6. Recognize clinically significant drug interactions associated with oral contraceptives.	Contraception		

		7. Provide patient counseling on the correct use of oral and barrier contraceptive methods. 8. Explain the role and use of emergency contraception in preventing unintended pregnancy.			
9	2	1. Explain the physiological changes associated with menopause. 2. Recognize common signs and symptoms of menopause. 3. Define desired therapeutic outcomes for patients receiving menopausal hormone replacement therapy (MHRT). 4. Assess patient suitability for MHRT based on clinical risk factors. 5. Recommend appropriate nonpharmacologic and pharmacologic treatments for menopausal symptoms. 6. Develop a monitoring plan to evaluate the safety and effectiveness of therapy.	Hormone replacement therapy		
10	2	1. Explain the underlying etiologies of dysmenorrhea, amenorrhea, and anovulatory bleeding. 2. Describe the physiologic changes associated with dysmenorrhea, amenorrhea, and anovulatory bleeding.	Menstruation related disorders		

		Recognize the clinical signs and symptoms of these menstruation-related disorders. Define desired therapeutic outcomes for patients with dysmenorrhea, amenorrhea, and anovulatory bleeding. Recommend appropriate nonpharmacologic and pharmacologic management strategies for menstruation-related disorders. Develop a monitoring plan to evaluate the safety and effectiveness of therapy.			
11	2	Explain the fundamental pathophysiology of cancer. Define the Tumor–Node–Metastasis (TNM) staging system used to classify cancer extent and spread. Describe cancer prevention and treatment strategies. Outline the role of healthcare professionals in preventing medication errors during cancer therapy.	Cancer chemotherapy		
12	2	Describe the underlying pathophysiological mechanisms of selected leukemia subtypes. Identify the characteristic clinical manifestations and	Leukemia		

		laboratory abnormalities associated with leukemia. 3. Evaluate key clinical and disease-related factors that influence the selection of appropriate chemotherapeutic regimens. 4. Summarize current therapeutic approaches used in the management of selected types of leukemia. 5. Recognize common treatment-related complications and adverse effects associated with leukemia therapies.			
13	2	1. Describe the major risk factors associated with the development of breast cancer. 2. Identify clinical signs and symptoms of breast cancer in both early and advanced stages. 3. Differentiate between favorable and unfavorable prognostic factors in breast cancer. 4. Define treatment goals for early-stage, locally advanced, and metastatic breast cancer. 5. Outline the available treatment modalities for breast cancer, including local and systemic therapies. 6. Explain the clinical significance of hormone receptors, HER2, and PD-1	Breast cancer		

		expression in breast cancer management. 7. Evaluate the benefits and potential risks associated with different breast cancer treatment options.			
14	2	1. Identify major risk factors associated with the development of prostate cancer. 2. Evaluate prognostic indicators and patient-specific factors to guide appropriate treatment selection. 3. Assess available pharmacotherapeutic options for the management of different stages and types of prostate cancer. 4. Recognize common adverse effects and develop a monitoring plan for patients receiving androgen deprivation therapy, based on individual patient characteristics and treatment regimens. 5. Identify treatment-related adverse effects and monitoring requirements for patients with metastatic prostate cancer. 6. Recommend appropriate strategies to maintain bone health in patients undergoing treatment for prostate cancer.	Prostate cancer		
15	2	1. Describe common and clinically significant adverse effects associated with chemotherapy.	Chemotherapy adverse effects		

		2. Recognize problematic and potentially serious chemotherapy-related toxicities that require intervention. 3. Explain preventive strategies used to reduce the risk of selected chemotherapy-induced adverse effects. 4. Discuss available management and treatment options for selected chemotherapy-related adverse effects.			
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11. Course Evaluation

20% Midterm exam, 10% (Quizzes, attendance, active participation in class, assignment), 70% final

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	- Pharmacotherapy: A pathophysiologic approach (last Edition). - Barbara G.Wells & Joseph T. Dipiro, Pharmacotherapy handbook last Edition. - Chisholm-Burns, Marie A., Patrick M. Malone, Terry L. Schwinghammer, Jill M. Kolesar, Barbara G. Wells, and Joseph T. DiPiro. Pharmacotherapy principles & practice. 6th edition. . Roger Walker, Clive Edwards (eds), Clinical Pharmacy & Therapeutics. - ACCP updates in therapeutics. - Applied Therapeutics: The Clinical Use of Drugs.
Main references (sources)	- Pharmacotherapy: A pathophysiologic approach (last Edition). - Barbara G.Wells & Joseph T. Dipiro, Pharmacotherapy handbook last Edition. - Chisholm-Burns, Marie A., Patrick M. Malone, Terry L. Schwinghammer, Jill M. Kolesar, Barbara G. Wells, and Joseph T. DiPiro. Pharmacotherapy principles & practice. 6th edition. . Roger Walker, Clive Edwards (eds), Clinical Pharmacy & Therapeutics. - ACCP updates in therapeutics. - Applied Therapeutics: The Clinical Use of Drugs.

Recommended books and references (scientific journals, reports...)	- Pharmacotherapy: A pathophysiologic approach (last Edition). - Chisholm-Burns, Marie A., Patricia M. Malone, Terry L. Schwinghamm, Jill M. Kolesar, Barbara G. Wells, & Joseph T. DiPiro. Pharmacotherapy: principles & practice. last edition.
Electronic References, Websites	UpToDate Medscape Electronic books and review articles.

Course Description Form

1. Course Name:	
Applied therapeutics I	
2. Course Code:	
PH5103	
3. Semester / Year:	
First semester / 5 th stage	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
45hrs / 3 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Fahmi Yahya Ahmed Email: Fahmi.yahya@alayen.edu.iq	
8. Course Objectives	
Course Objectives	Upon completion of this course, students should be able to: 1. Explain the pathophysiology, clinical features, and treatment goals of common medical disorders, including cardiovascular, neurological, renal, hepatic, autoimmune, and gastrointestinal diseases. 2. Apply the principles of pharmaceutical care in the management of these conditions using a patient-centered approach. 3. Describe the pharmacology of commonly used medications, including therapeutic classes, indications, dosing, pharmacokinetics, adverse effects, and drug interactions. 4. Apply treatment algorithms and perform dose calculations based on patient-specific factors and clinical guidelines. 5. Evaluate clinical data and evidence-based guidelines to optimize drug therapy and improve patient outcomes. 6. Communicate effectively with healthcare professionals and patients, and provide patient education on medication use, safety, and adherence.
9. Teaching and Learning Strategies	
Strategy	1- Whiteboard, multimedia lectures, power point presentation 2- Class discussion 3- Case-based study 4- Handouts 5- Brainstorming 6- Problem solving
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Distinguish between the concepts of sensitivity and specificity as applied to laboratory diagnostic tests. Recognize standard reference ranges for commonly requested laboratory investigations. Differentiate between normal and abnormal liver function test results and relate findings to clinical conditions. Differentiate between normal and abnormal renal function parameters and assess their clinical significance. Interpret complete blood count (CBC) results and identify common hematological abnormalities. Interpret key urinalysis findings and correlate them with possible disease states. Analyze hematological laboratory investigations to support clinical decision-making.	Interpretation of Clinical Laboratory data.	- Whiteboard, multimedia lectures, power point presentation - Class discussion - Case-based study - Handouts - Brainstorming - Problem solving	- Short MCQs - Oral exam and direct questions in the class - Midterm exam - Electronic exams on the electronic platform - Final exam - Reports and Assignments
1	1	Classify the major types of lipid abnormalities and recognize their clinical significance. Identify patient groups eligible for	Dyslipidemia		

		statin therapy and differentiate between statin intensity levels. 3. Recommend appropriate therapeutic lifestyle modifications and pharmacological treatments for the management of dyslipidemia. 4. Assess a patient's atherosclerotic cardiovascular disease (ASCVD) risk and determine corresponding lipid treatment targets. 5. Identify patients who require non-statin lipid-lowering therapies based on clinical indications and treatment response. 6. Outline a monitoring plan to evaluate therapeutic efficacy and detect adverse effects of lipid-lowering medications. 7. Provide patient education regarding dyslipidemia, lifestyle modifications, and the safe and effective use of prescribed medications.			
2	2	1. Explain the pathophysiology of acute coronary syndrome, including plaque rupture and thrombosis. 2. Differentiate between types of ACS, including unstable angina, NSTEMI, and STEMI. 3. Recognize the clinical presentation and	Acute coronary syndrome		

		diagnostic features of ACS, including ECG changes and cardiac biomarkers. 4. Identify key risk factors and precipitating factors associated with ACS. 5. Describe the goals of therapy in the acute and long-term management of ACS. 6. Select appropriate pharmacologic therapy for ACS, including antiplatelets, anticoagulants, anti-ischemic agents, and reperfusion therapy. 7. Determine indications for reperfusion strategies, including thrombolysis and percutaneous coronary intervention (PCI). 8. Develop a patient-specific treatment plan for ACS, including secondary prevention strategies. 9. Outline monitoring parameters to assess treatment effectiveness and detect adverse effects.			
3	2	1. Describe the phases of the cardiac action potential and their clinical relevance. 2. Explain the modified Vaughan Williams classification of antiarrhythmic drugs. 3. Differentiate common cardiac arrhythmias by risk factors, mechanisms, clinical features, and therapeutic goals,	Arrhythmia		

		including sinus bradycardia, AV block, atrial fibrillation, PSVT, PVCs, ventricular tachycardia (including torsades de pointes), and ventricular fibrillation. 4. Compare treatment approaches for sinus bradycardia and atrioventricular block. 5. Compare mechanisms of action of medications used for ventricular rate control, rhythm conversion, and maintenance of sinus rhythm in atrial fibrillation. 6. Compare warfarin and non–vitamin K antagonist oral anticoagulants (NOACs) for stroke prevention in patients with atrial fibrillation. 7. Describe pharmacologic and nonpharmacologic management options for acute termination and long-term prevention of paroxysmal supraventricular tachycardia. 8. Explain treatment strategies for ventricular arrhythmias, including pharmacologic therapy and indications for nonpharmacologic interventions in ventricular tachycardia and ventricular fibrillation.			
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		9. Develop patient-specific treatment plans for common arrhythmias based on clinical presentation and patient characteristics.			
4	2	1. Identify risk factors, signs, and symptoms of deep vein thrombosis (DVT) and pulmonary embolism (PE). 2. Explain the basic processes of hemostasis and thrombosis. 3. Assess a patient's risk for developing venous thromboembolism. 4. Recommend appropriate prevention strategies for patients at risk of DVT. 5. Select and interpret laboratory tests used to monitor antithrombotic therapy. 6. Identify factors that increase bleeding risk in patients receiving anticoagulant therapy. 7. Describe key advantages of newer anticoagulants (e.g., LMWHs, fondaparinux, direct thrombin inhibitors, and factor Xa inhibitors) compared with unfractionated heparin and warfarin. 8. Manage warfarin-related toxicity, including elevated	Deep Vein Thrombosis		

		INR with or without bleeding. 9. Recognize clinically important drug–drug and drug–food interactions involving anticoagulants. 10. Develop an appropriate treatment plan for patients diagnosed with DVT or PE.			
4/5	4	Required LO for stroke: 1. Differentiate between major types of cerebrovascular disease, including transient ischemic attack (TIA), ischemic stroke, and hemorrhagic stroke. 2. Identify modifiable and non-modifiable risk factors associated with ischemic and hemorrhagic stroke. 3. Explain the underlying pathophysiology of ischemic and hemorrhagic stroke. 4. Recognize the clinical manifestations of TIA, ischemic stroke, and hemorrhagic stroke. 5. Propose strategies for the primary prevention of ischemic stroke. 6. Evaluate available therapeutic options for the management of acute ischemic stroke. 7. Assess patient eligibility for fibrinolytic therapy	Stroke and shock		

		in acute ischemic stroke. 8. Evaluate the indications and role of endovascular interventions in acute ischemic stroke management. 9. Develop strategies for secondary prevention following ischemic stroke. 10. Evaluate treatment approaches for acute hemorrhagic stroke. Required LO for Shok: 1. Classify the major types of shock and identify their underlying etiologies. 2. Describe the key hemodynamic disturbances associated with different shock states. 3. Recognize the typical clinical presentation of shock, including signs, symptoms, and relevant laboratory findings. 4. Develop an initial treatment plan for patients with shock, incorporating fluid resuscitation, pharmacologic therapy, and clearly defined therapeutic goals. 5. Compare crystalloids, colloids, and blood products, highlighting their advantages, limitations, and			
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		appropriate use in shock management.			
6/7	5	1. Explain the pathophysiological mechanisms underlying cirrhosis and portal hypertension. 2. Recognize the clinical signs and symptoms associated with cirrhosis. 3. Identify abnormal laboratory findings in liver disease and relate them to underlying pathophysiology. 4. Describe the clinical consequences of impaired hepatic function. 5. Define therapeutic goals in the management of patients with cirrhosis and its complications. 6. Recommend appropriate management strategies for cirrhosis, including lifestyle modifications, nonpharmacologic interventions, and pharmacologic therapy.	Liver Cirrhosis,		
		1. Differentiate the major types of viral hepatitis based on epidemiology, etiology, and clinical presentation. 2. Identify routes of transmission and key risk factors associated with viral hepatitis. 3. Interpret hepatic serologic markers to	Viral hepatitis,		

		determine the type of viral hepatitis. 4. Define appropriate therapeutic goals for patients with viral hepatitis. 5. Recommend pharmacologic strategies for the prevention of viral hepatitis. 6. Develop a comprehensive care plan for the management of chronic viral hepatitis.			
		1. Explain the pathophysiological mechanisms involved in inflammatory bowel disease (IBD). 2. Recognize the clinical features of IBD and distinguish between ulcerative colitis and Crohn's disease. 3. Define appropriate therapeutic goals for patients with IBD. 4. Describe pharmacologic treatment options for acute and chronic management of ulcerative colitis and Crohn's disease. 5. Develop patient-specific treatment plans based on disease severity, symptoms, and disease location. 6. Recommend appropriate monitoring parameters to assess the safety and effectiveness of IBD therapies.	Inflammatory bowel diseases		
7/8	4	Required LO for AKI:	Acute kidney		

		1. Evaluate kidney function using clinical assessment, laboratory findings, and urinary indices. 2. Identify therapeutic goals and clinical endpoints in the management of acute kidney injury (AKI). 3. Apply knowledge of AKI pathophysiology to develop an appropriate treatment plan. 4. Formulate strategies to prevent or minimize drug-induced AKI. 5. Monitor and assess the safety and effectiveness of the treatment plan. CLO for CKD: 1. Identify risk factors that increase susceptibility to chronic kidney disease (CKD). 2. Explain the pathophysiological mechanisms involved in the progression of CKD. 3. Define the therapeutic goals and desired clinical outcomes in the management of CKD. 4. Develop strategies to slow CKD progression, including lifestyle modifications and pharmacologic interventions. 5. Recognize common complications and	Failure (AKI), Chronic kidney failure (CKD), hemodialysis and peritoneal dialysis		
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		consequences associated with CKD. 6. Design appropriate therapeutic plans to manage CKD-related complications. CLO for hemodialysis and peritoneal dialysis: 1. Identify clinical indications for initiating dialysis. 2. Compare hemodialysis and peritoneal dialysis, including their advantages and limitations. 3. Explain the fundamental principles and procedures of hemodialysis and peritoneal dialysis. 4. Recognize common complications of hemodialysis and peritoneal dialysis and outline their management.			
9	4	1. Estimate the distribution and volume of body fluid compartments. 2. Identify the major electrolytes present in extracellular and intracellular fluid compartments. 3. Explain the relationship between serum sodium levels and total body water (TBW). 4. Describe the causes, clinical features, and management strategies of disorders involving sodium,	Disorders of fluid and electrolytes		

		potassium, calcium, phosphorus, and magnesium.			
10/11	8	1. Describe the epidemiology and societal impact of epilepsy. 2. Define key terminology related to epilepsy, including seizures and convulsions. 3. Explain the fundamental pathophysiology of seizures and epilepsy. 4. Classify seizure types based on clinical presentation and electroencephalogram (EEG) findings. 5. Identify therapeutic goals and key decision points in the management of epilepsy. 6. Discuss nonpharmacologic management options for epilepsy. 7. Recommend appropriate antiepileptic drug (AED) therapy, including relevant monitoring parameters. 8. Develop a strategy for transitioning between antiepileptic regimens when clinically indicated. 9. Recognize and manage clinically significant drug interactions involving AEDs. 10. Determine appropriate criteria and procedures for	Epilepsy		

		discontinuation of antiepileptic therapy.			
		1. Explain the pathophysiology of Parkinson's disease, including neurotransmitter involvement and therapeutic targets. 2. Identify the cardinal motor features of Parkinson's disease and assess disease severity and progression. 3. Recommend appropriate initial pharmacotherapy and establish patient-specific treatment goals. 4. Identify and manage nonmotor symptoms associated with Parkinson's disease. 5. Develop strategies to optimize "on-time" and reduce "off-time", including appropriate medication timing, dosing, and frequency. 6. Recognize and manage motor complications related to Parkinson's disease and its treatment. 7. Provide effective patient counseling on medications and lifestyle modifications for Parkinson's disease. 8. Design a monitoring plan to evaluate treatment effectiveness and detect adverse effects.	Parkinson's disease		

		1. Identify risk factors associated with multiple sclerosis (MS). 2. Differentiate between clinical forms of MS based on disease course and patient presentation. 3. Compare disease-modifying therapy options and select appropriate treatments for individual patients. 4. Determine appropriate symptomatic management strategies for patients with MS. 5. Develop a monitoring plan to assess the safety and effectiveness of MS pharmacotherapy.	Multiple sclerosis		
		1. Differentiate types of pain including nociceptive, inflammatory, neuropathic, and functional pain. 2. Explain the basic mechanisms of pain transmission. 3. Select appropriate pain assessment tools based on patient characteristics. 4. Recommend suitable analgesic therapy, including drug choice, dose, and monitoring, according to pain type, severity, and patient-specific factors. 5. Perform basic analgesic dose calculations, including	Pain management		

		equianalgesic conversions, opioid switching, rescue dosing, and conversion to continuous infusion. 6. Provide patient and caregiver education on effective pain management, chronic pain coping strategies, and nonpharmacologic interventions.			
		1. Differentiate major headache syndromes based on clinical characteristics. 2. Recommend appropriate nonpharmacologic strategies for headache management and prevention. 3. Determine indications for pharmacologic therapy in headache disorders. 4. Develop individualized treatment plans for acute and preventive management of headache syndromes. 5. Monitor therapy outcomes to ensure safety, tolerability, and clinical effectiveness.	Headache disorders		
12	4	1. Identify appropriate clinical indications for parenteral nutrition (PN) in adult patients. 2. Describe the components of parenteral nutrition and their roles in nutritional support. 3. Develop a patient-specific plan to initiate, design, and	Parenteral		

		modify a parenteral nutrition regimen. 4. Explain the causes and risk factors of macronutrient-related complications associated with PN. 5. Describe the etiology, risk factors, and prevention strategies for refeeding syndrome.			
		1. Assess patient-specific factors to determine the appropriateness of enteral nutrition (EN). 2. Compare enteral and parenteral nutrition with respect to efficacy, complications, and cost. 3. Describe the components of enteral nutrition and their roles in nutrition support therapy. 4. Develop a patient-specific plan to initiate, formulate, and adjust enteral nutrition regimens. 5. Identify causes and risk factors for complications associated with enteral nutrition. 6. Select appropriate medication administration strategies for patients receiving enteral nutrition.	Enteral nutrition		
13	2	1. Define pharmacovigilance and describe its scope in healthcare practice.	Pharmacovigilance		

		2. Identify individuals and healthcare professionals responsible for reporting pharmacovigilance data. 3. Explain the importance and objectives of pharmacovigilance in ensuring medication safety. 4. Describe key historical adverse drug reaction (ADR) events that shaped pharmacovigilance systems. 5. Explain the principles of causality assessment in adverse drug reaction reporting. 6. Recognize commonly used terminology in pharmacovigilance practice.			
14	3	1. Explain the pathophysiology of benign prostatic hyperplasia (BPH). 2. Recognize common signs and symptoms associated with BPH. 3. Define desired therapeutic outcomes in the management of BPH. 4. Identify patient-specific factors that guide the selection of α1-adrenergic antagonists. 5. Compare α1-adrenergic antagonists and 5α-reductase inhibitors in terms of mechanism of action, clinical	Benign prostatic hyperplasia (BPH)		

		outcomes, adverse effects, and drug interactions. 6. Describe the indications, benefits, and limitations of combination pharmacotherapy for BPH, including α1-adrenergic antagonists, 5α-reductase inhibitors, anticholinergics, tadalafil, and mirabegron. 7. Identify indications for surgical intervention in patients with BPH. 8. Apply the patient care process to develop an individualized treatment plan for BPH.			
15	2	1. Identify risk factors for primary open-angle glaucoma (POAG) and acute angle-closure glaucoma. 2. Determine appropriate glaucoma screening intervals based on patient-specific risk factors. 3. Differentiate the pathophysiologic mechanisms of open-angle glaucoma and acute angle-closure glaucoma. 4. Recognize the clinical features of chronic open-angle glaucoma and acute angle-closure glaucoma. 5. Define therapeutic goals for glaucoma suspects, patients with	Glaucoma		

		POAG, and those with acute angle-closure glaucoma. 6. Select appropriate treatment options for glaucoma based on individual patient characteristics. 7. Develop a monitoring plan to assess treatment effectiveness and adverse effects. 8. Provide patient counseling on glaucoma, medication use, proper ophthalmic administration techniques, and the importance of adherence.			
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11. Course Evaluation

20% Midterm exam, 10% (Quizzes, attendance, active participation in class, assignment), 70% final

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	- Pharmacotherapy: A pathophysiologic approach (last Edition). - Barbara G.Wells & Joseph T. Dipiro, Pharmacotherapy handbook last Edition. - Chisholm-Burns, Marie A., Patrick M. Malone, Terry L. Schwinghammer, Jill M. Kolesar, Barbara G. Wells, and Joseph T. DiPiro. Pharmacotherapy principles & practice. 6th edition. . Roger Walker, Clive Edwards (eds), Clinical Pharmacy & Therapeutics. - ACCP updates in therapeutics. - Applied Therapeutics: The Clinical Use of Drugs.
Main references (sources)	- Pharmacotherapy: A pathophysiologic approach (last Edition). - Barbara G.Wells & Joseph T. Dipiro, Pharmacotherapy handbook last Edition. - Chisholm-Burns, Marie A., Patrick M. Malone, Terry L. Schwinghammer, Jill M. Kolesar, Barbara G. Wells, and Joseph T. DiPiro. Pharmacotherapy principles & practice. 6th edition. . Roger Walker, Clive Edwards (eds), Clinical Pharmacy & Therapeutics. - ACCP updates in therapeutics.

	- Applied Therapeutics: The Clinical Use of Drugs.
Recommended books and references (scientific journals, reports...)	- Pharmacotherapy: A pathophysiologic approach (last Edition). - Chisholm-Burns, Marie A., Patrick M. Malone, Terry L. Schwinghammer, Jill M. Kolesar, Barbara G. Wells, and Joseph T. DiPiro. Pharmacotherapy principles & practice. last edition.
Electronic References, Websites	UpToDate Medscape Electronic books and review articles.

Course Description Form

1.Course Name:	
Clinical chemistry	
2.Course Code:	
PH5104	
3.Semester / Year:	
First semester /fifth year	
4.Description Preparation Date:	
2025-2026	
5.Available Attendance Forms:	
Full-time and official attendance hours	
6.Number of Credit Hours (Total) / Number of Units (Total)	
3x15= 45 hrs (theoretical) 2x15=30 hrs (practical) /number of units = 4	
7.Course administrator's name (mention all, if more than one name)	
Name: Rand Salah	
8.Course Objectives	
Course Objectives	-Helping to understand the principles of clinical chemistry. -Providing a solid foundation for a successful chemical career. -Providing the student with some basic skills that may be necessary for future studies, such as analyzing results and documents and using the Internet. -Enabling the student to prepare seminars on advanced clinical chemistry topics.
9.Teaching and Learning Strategies	

Strategy	–PowerPoint and Multimedia presentation –Class discussion. –Visual aids: Utilize visual aids such as pictures, charts, graphs, diagrams
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10.Course Structure

Course Structure (Theory)

Wee k	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1&2	6	Understanding abnormalities in metabolism of glucose and related disorders and the laboratory assessment	Disorders of Carbohydrates metabolism, Hyperglycemia & Diabetes mellitus, Hypoglycemia	smartboard/ Presentation slides/ discussion	Oral questions and written exams
3	3	Understanding abnormalities in metabolism of lipids and the laboratory assessment	Disorders of lipid metabolism	smartboard/ Presentation slides/ discussion	Oral questions and written exams
4	3	Understanding of the metabolic, synthetic and excretory functions of the liver and the related disorders; and the laboratory assessment of liver functions.	Liver Function Tests	smartboard/ Presentation slides/ discussion	Oral questions and written exams
5	3	Understanding of excretory functions of	Kidney Function	smartboard/ Presentation	Oral questions

		the kidney and its role in maintaining blood hemostasis and elimination of waste products	Tests	slides/ discussion	and written exams
6	6	Understand of hormones types, functions and regulation, with special emphasis on the hypothalamic hormones	Hypothalamus & pituitary endocrinology, \adrenal gland	smartboard/ Presentation slides/ discussion	Oral questions and written exams
7	6	The male and female reproductive glands hormones and the physiologic and pathologic alterations in their levels	Reproductive System	smartboard/ Presentation slides/ discussion	Oral questions and written exams
8	3	The thyroid gland hormones actions and disorders; and the laboratory analyses of thyroid gland disorders	Thyroid function tests	smartboard/ Presentation slides/ discussion	Oral questions and written exams
9	3	Classify disorders of calcium metabolism. Recognize causes of hypo- and hypercalcemia.	Disorders of calcium metabolism	smartboard/ Presentation slides/ discussion	Oral questions and written exams
10	3	Understand the basic pathogenic mechanisms. And Classify the main types of metabolic	Inborn errors of metabolism	smartboard/ Presentation slides/ discussion	Oral questions and written exams

		disorders.			
11.Course Evaluation					
Midterm Exam 15 marks					
Quizzes and activities 5 marks					
Practical part 20 marks					
Final Exam 60 marks					
12.Learning and Teaching Resources					
Required textbooks (curricular books, any)			Clinical chemistry crook last edition		
Main references (sources)					
Recommended books and references (scientific journals, reports...)			Clinical chemistry marshal last edition		
Electronic References, Websites					

Course Description Form

1.Course Name:					
Clinical laboratory training					
2.Course Code:					
PH5105					
3.Semester / Year:					
First semester/ Fifth year					
4.Description Preparation Date:					
2025-2026					
5.Available Attendance Forms:					
Full-time and official attendance hours					
6.Number of Credit Hours (Total) / Number of Units (Total)					
4x15= 60hrs (practical) /number of units = 2					
7.Course administrator's name (mention all, if more than one name)					
Name: Moatasem Al-Salih and Ramiz Talib Email: moatasem.alsalih@alayen.edu.iq and ramiz.talb@alayen.edu.iq					
8.Course Objectives					
Course Objectives		1-Providing students with the necessary technical skills and principles of laboratory tests in the field of clinical biochemistry, serology, hematology, and microbiology. 2- Illustrating the range of applications as well as limitations of different laboratory techniques. 3- Relating the laboratory findings to the process of clinical diagnosis and management.			
9.Teaching and Learning Strategies					
Strategy		• Laboratory practical training • Discussions • Reports			
10.Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	2	Understand clinical laboratory roles, safety, workflows, quality control, and applications.	General Introduction to Clinical Laboratory	Lecture+ Group Discussion Practical Training Case Study	Short quiz Practical assessment report practical exam final exam
Week 2	2	Perform glucose testing accurately, interpret results, ensure safety and quality.	Blood Glucose Test		

Week3	2	Measure blood cholesterol accurately, interpret lipid profiles, apply quality control.	Blood Cholesterol Test		
Week4	2	Perform BUN testing accurately, interpret renal function, ensure laboratory quality.	Blood Urea Nitrogen (BUN) Test		
Week5	2	Measure liver enzymes accurately, interpret hepatic function, apply quality control.	Liver Enzyme		
Week6	2	Measure blood calcium accurately, interpret metabolic disorders, ensure laboratory quality.	Calcium Blood Level Test		
Week7	2	Perform bilirubin testing accurately, interpret jaundice causes, ensure laboratory quality.	Bilirubin Test		
Week8	2	Perform serological tests accurately, detect antibodies, interpret immune responses.	Serological Tests		
Week9	2	Comprehensive assessment of the student's practical,	Final Assessment		

		analytical, and cognitive skills in the clinical laboratory.			
11.Course Evaluation					
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports.					
12.Learning and Teaching Resources					
Required textbooks (curricular books, if any)		1- Clinical Laboratory Science: The Basics and Routine Techniques” by Mary Louise Turgel 2- Clinical Chemistry: Principles, Techniques, and Correlations” by Michael L. Bishop, Edward P. Fody, and Larry E. Schoeff			
Main references (sources)		1- Harper’s Illustrated Biochemistry” by Robert K. Murray, Daryl Granner, Peter A. Mayes, Victor W. Rodwell 2- Medical Biochemistry” by John W. Baynes and Marek Dominiczka 3- Basic Clinical Laboratory Techniques” by Barbara H. Estridge			
Recommended books and references (scientific journals, reports...)					
Electronic References, Websites		Internet PowerPoint Presentations			

Course Description Form

1. Course Name:	
Clinical toxicology	
2. Course Code:	
PH5106	
3. Semester / Year:	
first semester/- Fifth stage	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours/week (theoretical), 2 hours/week (practical), total units = 3	
7. Course administrator's name (mention all, if more than one name)	
Name: Ruaa Yasir Altayeb Email: Ruaa.Yasir@alayen.edu.iq	
8. Course Objectives	
Course Objectives	The primary objective of this clinical toxicology course for pharmacy students is to provide a comprehensive understanding of the principles and practices of clinical toxicology, equipping them with the knowledge and skills necessary to effectively manage poisonings and drug overdoses. They will be capable of identifying and classifying common toxic substances, recognizing clinical manifestations of poisoning, and describing appropriate diagnostic and management strategies, including the use of antidotes and supportive care. Furthermore, students will learn to apply critical thinking skills to specific poisoning cases, effectively communicate with patients and healthcare professionals, and appreciate the role of poison control centers and the pharmacist's contributions to patient safety in toxicology.
9. Teaching and Learning Strategies	
Strategy	

	1.lectures included multimedia lectures 1. power point presentation 2. class activity 3. brain storming 4. practical work				
10. Course Structure					
Week	Hrs.	CLOs	Unit/Module or Topic Title	Teaching and Learning Methods	Assessment methods
1.	2	–Identify vital signs –Understand steps of clinical strategy for management of poisoned patients	Initial evaluation of the poisoned patient	–lectures included multimedia lectures –power point presentation	–Short MCQs – Direct questions in the class –Midterm exam –Electronic exams on the electronic platform – Final exam
2.	2	–Explain mechanism of toxicity, symptoms and diagnosis –Study management of toxicity	Drug Toxicity: Over the counter drugs; caffeine; theophylline; antihistamine and decongestant; vitamins.		
3.	2	–Explain mechanism of toxicity, clinical signs of acute and chronic toxicity – Study management of toxicity	beta blockers		
4.	2	–Explain mechanism of toxicity, clinical signs of toxicity and diagnosis – Study management of toxicity	anti–cholinergic phenothiazines		
5.	2	–Explain mechanism of toxicity, –Describe clinical signs of acute and chronic toxicity – Identify diagnosis	CNS stimulant		

		– Study management of toxicity			
6.	2	–Explain mechanism of toxicity –Describe clinical signs of acute and chronic toxicity – Study management of toxicity	hypoglycemic drugs		
7.	2	–Explain mechanism of toxicity –Describe clinical signs of acute and chronic toxicity – Study management of toxicity	tricyclic antidepressants		
8.	2	–Understand mechanism of toxicity –Describe clinical signs of acute and chronic toxicity – Identify diagnosis – Study management of toxicity	Opioids;		
9.	2	–Explain mechanism of toxicity –Describe clinical signs of acute and chronic toxicity and identify diagnosis – Study management of toxicity	Cocaine		
10.	2	–Explain mechanism of toxicity –Describe clinical signs of acute and chronic toxicity and identify diagnosis – Study management of toxicity	Cannabinoids		
11	2	–Classify hydrocarbons –Explain mechanism of toxicity –Describe clinical signs of acute and chronic toxicity and identify diagnosis	Hydrocarbons		

		– Study management of toxicity			
12	2	Explain mechanism of toxicity –Describe clinical signs of acute and chronic toxicity and identify diagnosis – Study management of toxicity	Household toxins;		
13	2	–Explain mechanism of toxicity –Describe clinical signs of acute and chronic toxicity and identify diagnosis – Study management of toxicity	CNS depressants		
14	2	–Study mechanisms of common toxic plants – Describe clinical signs of toxicity – Study management of toxicity	Botanicals and plants–derived toxins		
15	2	–Explain mechanism of toxicity –Describe clinical signs of acute and chronic toxicity and identify diagnosis – Study management of toxicity	non–steroidal anti–inflammatory drugs;		

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	.–Casarett & Doull's Toxicology: The Basic Science of Poisons by Curtis D. Klaassen, 10th Editio –Idfranks Toxicologic Emergencies, Ninth edition
Main references (sources)	Poisoning and drug overdose, edition

Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	• www.pubmed.com • www.biomed.net • www.ncbi.nlm.nih.gov • <u>Jornal of clinical toxicology.</u>



ALAYEN IRAQI
UNIVERSITY
AL-QADISIYA

Course Description Form

1. Course Name:	
Drug Delivery Systems Design	
2. Course Code:	
PH5206	
3. Semester / Year:	
Second semester/ fifth year	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours/week (theoretical) , total units = 2	
7. Course administrator's name (mention all, if more than one name)	
Name: 1- Associated prof. Dr. Mohammed Sherif saddik Ibrahim 2-Lecturer Dr. Samer Khalid Ali Email: 1- Sherif@alayer.edu.iq 2- Samer.ali@alayer.edu.iq	
8. Course Objectives	
Course Objectives	1) Explain the process of new drug development, including drug discovery, preclinical evaluation, early formulation studies, and regulatory submission of INDs, NDAs, and ICH guidelines. 2) Explore the principles and applications of pharmaceutical nanotechnology, including the design and use of liposomes, dendrimers, micelles, solid nanoparticles, and lipid-based delivery systems in modern therapeutics. 3) Describe the anatomical and physiological considerations for non-oral routes of drug delivery, including nasal, ocular, transdermal, and pulmonary routes.

	4)Analyze formulation challenges and strategies for improving drug solubility, permeability, bioavailability, and patient adherence across various advanced delivery systems. 5)Evaluate the design, function, and clinical considerations of innovative delivery platforms such as patches, inhalers, eye drops, and nanoparticle-based systems				
9. Teaching and Learning Strategies					
Strategy		Lectures and Presentation, Interactive discussions related photos and videos, brainstorm, and Inverted classrooms with learning strategies			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1–3	6	Explain drug discovery and design, biologic characterization, early formulation studies, IND and NDA applications, supplemental and abbreviated submissions, and the role of ICH in regulatory harmonization.	New Drug Development and Approval Process	smartboard/ Presentation Slides /Discussion	oral questions and written exams
4–7	7	Explain the principles and applications of pharmaceutical nanotechnology, including polymer–drug conjugates, dendrimers, micelle systems, solid nanoparticles, liposomes, lipid-based vesicles, microcapsules, microspheres, and recent developments in nanomedicine.	Pharmaceutical Nanotechnology and Nanomedicines	smartboard/ Presentation Slides /Discussion	oral questions and written exams

7-9	4	Describe nasal anatomy and physiology, explain drug delivery principles, and discuss nasal drug delivery systems and their applications.	Nasal Drug Delivery	smartboard/ Presentation Slides /Discussion	oral questions and written exams
9-11	5	Describe ocular anatomy, common eye conditions and treatments, formulate ophthalmic preparations, overcome absorption barrier ensure sterility, and evaluate ocular drug delivery systems.	Ocular Drug Delivery	smartboard/ Presentation Slides /Discussion	oral questions and written exams
12-13	4	Describe factors affecting percutaneous absorption, absorption enhancers, TDDS design features, advantages and limitations, examples of transdermal systems, and clinical considerations.	Transdermals and Transdermal Drug Delivery Systems	smartboard/ Presentation Slides /Discussion	oral questions and written exams
14-15	4	Explain inhaled drug delivery principles, formulate and deliver therapeutic aerosols, and describe methods for aerosol size analysis.	Pulmonary Drug Delivery	smartboard/ Presentation Slides /Discussion	oral questions and written exams

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Aulton's Pharmaceutics; The Design and Manufacture of Medicines; 6th edition, 2022.
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Main references (sources)	Pharmaceutical Dosage forms and Delivery Systems by Howard A. Ansel; 10th edition, 2017.
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Hospital training	
2. Course Code:	
PH5205	
3. Semester / Year:	
2 nd semester / 5 th stage	
4. Description Preparation Date:	
2025–2026	
5. Available Attendance Forms:	
Full–time and official attendance hours at the hospital departments	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4hrs / 2 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Thaer Lateef Gabar Email: Thaer.lateef@alayen.edu.iq Name: Dr. Fahmi Yahya Ahmed Email: Fahmi.yahya@alayen.edu.iq Name: Ammar Mohammed Atiyah Email: Ammar.atiyah@alayen.edu.iq Name: Dr. Amira Amin Email: Amiramin@alayen.edu.iq	
8. Course Objectives	
Course Objectives	Teach students to apply pharmacy practice to different hospital wards includes training on evaluating and following up the condition, evaluating therapeutic regimens, recording errors related to drug treatment, and providing ideas to solve problems.
9. Teaching and Learning Strategies	
Strategy	–Conducting scientific discussions with doctors in the hospital. –Putting questions to stimulate brainstorming. –Providing explanations of medical cases for patients residing in various hospital departments. –Evaluating and following up on cases, in addition to evaluating

treatment plans, recording errors related to drug therapy, and providing suggestions for solving problems.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	This course aims to provide students with essential clinical pharmacy skills, with a strong emphasis on patient-centered care and effective interaction with patients and healthcare teams. Students will develop the ability to assess and explain patient cases, interpret medical charts and laboratory results, and apply appropriate clinical monitoring to optimize pharmacotherapy. The course covers major clinical areas, including cardiology, nephrology, gastroenterology, pulmonology, and endocrinology.	Clinical Pharmacy Practice in Internal Medicine: Clinical observation of cases; evaluation of the case sheets; case presentation; discussion and evaluation	-Conducting scientific discussions with doctors in the hospital. -Putting questions to stimulate brainstorming. -Providing explanations of medical cases for patients residing in various hospital departments. -Evaluating and following up on cases, in addition to evaluating treatment plans, recording errors related to drug therapy, and providing suggestions for solving problems.	Written and oral tests, direct questions, and case presentations.
2	4	This course aims to provide students with essential clinical pharmacy skills, with a strong emphasis on patient-centered care and effective interaction with patients and healthcare teams. Students will develop the ability to assess and explain patient cases, interpret medical charts and laboratory results, and apply appropriate clinical monitoring to	Clinical Pharmacy Practice in Internal Medicine: Clinical observation of cases; evaluation of the case sheets; case presentation; discussion and evaluation		

		optimize pharmacotherapy. The course covers major clinical areas, including cardiology, nephrology, gastroenterology, pulmonology, and endocrinology.			
3	4	This course aims to provide students with essential clinical pharmacy skills, with a strong emphasis on patient-centered care and effective interaction with patients and healthcare teams. Students will develop the ability to assess and explain patient cases, interpret medical charts and laboratory results, and apply appropriate clinical monitoring to optimize pharmacotherapy. The course covers major clinical areas, including cardiology, nephrology, gastroenterology, pulmonology, and endocrinology.	Clinical Pharmacy Practice in Internal Medicine: Clinical observation of cases; evaluation of the case sheets; case presentation; discussion and evaluation		
4	4	This course aims to provide students with essential clinical pharmacy skills, with emphasis on patient care, interpretation of medical charts, evaluation of laboratory data, and application of clinical monitoring in surgical settings. Students will develop the ability to support pharmacotherapeutic	Clinical Pharmacy Practice in surgery: Clinical observation of cases; evaluation of the case sheets; case presentation; discussion and evaluation		

		decision-making throughout the perioperative period. The course covers key surgical topics, including surgical prophylaxis, types of surgical procedures, preoperative bowel preparation, intravenous fluid therapy, blood transfusion and blood products, perioperative management of diabetes, perioperative medication management, and the pharmacologic management of common surgical conditions such as acute appendicitis, gallstones, common bile duct stones, thyroidectomy, bowel obstruction, pancreatitis, and hernia. In addition, guidelines for parenteral nutrition in surgical patients are addressed.			
5	4	This course aims to provide students with essential clinical pharmacy skills, with emphasis on patient care, interpretation of medical charts, evaluation of laboratory data, and application of clinical monitoring in surgical settings. Students will develop the ability	Clinical Pharmacy Practice in surgery: Clinical observation of cases; evaluation of the case sheets; case presentation; discussion and evaluation		

		to support pharmacotherapeutic decision-making throughout the perioperative period. The course covers key surgical topics, including surgical prophylaxis, types of surgical procedures, preoperative bowel preparation, intravenous fluid therapy, blood transfusion and blood products, perioperative management of diabetes, perioperative medication management, and the pharmacologic management of common surgical conditions such as acute appendicitis, gallstones, common bile duct stones, thyroidectomy, bowel obstruction, pancreatitis, and hernia. In addition, guidelines for parenteral nutrition in surgical patients are addressed.			
6	4	This course aims to provide students with essential clinical pharmacy skills, with emphasis on patient care, interpretation of medical charts, evaluation of laboratory data, and application of clinical monitoring in surgical settings.	Clinical Pharmacy Practice in surgery: Clinical observation of cases; evaluation of the case sheets; case presentation; discussion and evaluation		

		Students will develop the ability to support pharmacotherapeutic decision-making throughout the perioperative period. The course covers key surgical topics, including surgical prophylaxis, types of surgical procedures, preoperative bowel preparation, intravenous fluid therapy, blood transfusion and blood products, perioperative management of diabetes, perioperative medication management, and the pharmacologic management of common surgical conditions such as acute appendicitis, gallstones, common bile duct stones, thyroidectomy, bowel obstruction, pancreatitis, and hernia. In addition, guidelines for parenteral nutrition in surgical patients are addressed.			
7	4	This course aims to provide students with essential clinical pharmacy skills, with a particular emphasis on patient care in pediatric populations, including effective interaction with	Clinical Pharmacy Practice in Paediatrics: Clinical observation of cases; evaluation of the case sheets; case presentation; discussion and evaluation		

		patients and caregivers, interpretation of medical charts, evaluation of laboratory data, and application of clinical monitoring principles. Learning activities focus on pediatric-specific case assessment and clinical decision-making. The course covers key pediatric clinical areas, including neonatology, nephrology, infectious diseases, neurology, cardiology, gastroenterology, respiratory disorders, and endocrinology.			
8	4	This course aims to provide students with essential clinical pharmacy skills, with a particular emphasis on patient care in pediatric populations, including effective interaction with patients and caregivers, interpretation of medical charts, evaluation of laboratory data, and application of clinical monitoring principles. Learning activities focus on pediatric-specific case assessment and clinical decision-making. The course	Clinical Pharmacy Practice in Paediatrics: Clinical observation of cases; evaluation of the case sheets; case presentation; discussion and evaluation		

		covers key pediatric clinical areas, including neonatology, nephrology, infectious diseases, neurology, cardiology, gastroenterology, respiratory disorders, and endocrinology.			
9	4	This course aims to provide students with essential clinical pharmacy skills, with a particular emphasis on patient care in pediatric populations, including effective interaction with patients and caregivers, interpretation of medical charts, evaluation of laboratory data, and application of clinical monitoring principles. Learning activities focus on pediatric-specific case assessment and clinical decision-making. The course covers key pediatric clinical areas, including neonatology, nephrology, infectious diseases, neurology, cardiology, gastroenterology, respiratory disorders, and endocrinology.	Clinical Pharmacy Practice in Paediatrics: Clinical observation of cases; evaluation of the case sheets; case presentation; discussion and evaluation		
10	4	This course aims to provide students	Clinical Pharmacy Practice in Obstetrics		

		with essential clinical pharmacy skills, with emphasis on patient care, interpretation of medical charts, evaluation of laboratory data, and application of clinical monitoring in obstetrics and gynecology practice. Students will develop the ability to support safe and effective pharmacotherapy across various reproductive health conditions. The course covers key topics including abortion, common complications of pregnancy, induction and augmentation of labor, obstetric hemorrhage, caesarean section, ectopic pregnancy, heavy and irregular menstruation, polycystic ovarian syndrome, molar pregnancy, and commonly used medications in obstetrics and gynecology.	and gynecology: Clinical observation of cases; evaluation of the case sheets; case presentation; discussion and evaluation		
11	4	This course aims to provide students with essential clinical pharmacy skills, with emphasis on patient care, interpretation of medical charts, evaluation of laboratory data, and application of	Clinical Pharmacy Practice in Obstetrics and gynecology: Clinical observation of cases; evaluation of the case sheets; case presentation; discussion and evaluation		

		clinical monitoring in obstetrics and gynecology practice. Students will develop the ability to support safe and effective pharmacotherapy across various reproductive health conditions. The course covers key topics including abortion, common complications of pregnancy, induction and augmentation of labor, obstetric hemorrhage, caesarean section, ectopic pregnancy, heavy and irregular menstruation, polycystic ovarian syndrome, molar pregnancy, and commonly used medications in obstetrics and gynecology.			
12	4	This course aims to provide students with essential clinical pharmacy skills, with emphasis on patient care, interpretation of medical charts, evaluation of laboratory data, and application of clinical monitoring in obstetrics and gynecology practice. Students will develop the ability to support safe and effective pharmacotherapy across various	Clinical Pharmacy Practice in Obstetrics and gynecology: Clinical observation of cases; evaluation of the case sheets; case presentation; discussion and evaluation		

		reproductive health conditions. The course covers key topics including abortion, common complications of pregnancy, induction and augmentation of labor, obstetric hemorrhage, caesarean section, ectopic pregnancy, heavy and irregular menstruation, polycystic ovarian syndrome, molar pregnancy, and commonly used medications in obstetrics and gynecology.			
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11. Course Evaluation

40 % (Quizzes, attendance, active participation, assignment, cases presentation), 60% final

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Clinical training materials prepared by clinical pharmacy professors. 1- Barbara G.Wells & Joseph T. Diriro, Pharmacotherapy handbook 12th Edition. 2- Chisholm-Burns, Marie A., Patrick M. Malone, Terry L. Schwinghammer, Jill M. Kolesar, Barbara G. Wells, and Joseph T. DiPiro. Pharmacotherapy principles & practice. 6th edition. 3. Roger Walker, Clive Edwards (eds), Clinical Pharmacy & Therapeutics 4. ACCP updates in therapeutics.
Main references (sources)	Clinical training materials prepared by clinical pharmacy professors. 1- Barbara G.Wells & Joseph T. Diriro, Pharmacotherapy handbook 12th Edition. 2- Chisholm-Burns, Marie A., Patrick M. Malone, Terry L. Schwinghammer, Jill M. Kolesar, Barbara G. Wells, and Joseph T. DiPiro. Pharmacotherapy principles & practice. 6th edition 3. Pharmacotherapy casebook: a patient focused approach, McGraw Hill) 4- Roger Walker, Clive Edwards (eds), Clinical Pharmacy & Therapeutics 6th edition.

	5-ACCP updates in therapeutics. 6. Department case sheets and manual
Recommended books and references (scientific journals, reports...)	Journal of Clinical pharmacy and therapeutics International journal of clinical pharmacology and therapeutics
Electronic References, Websites	UpToDate Medscape

Course Description Form

1. Course Name:	
Organic pharmaceutical chemistry IV	
2. Course Code:	
PH5101	
3. Semester / Year:	
First semester / fifth level	
4. Description Preparation Date:	
2025–2026	
5. Available Attendance Forms:	
Full–time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2x15= 30 hrs (theoretical) /number of units = 2	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Ranza Ahmed Abdo Hassan Elrayess Email: Ranza.Ahmed@alayen.edu.iq	
8. Course Objectives	
Course Objectives	- This course aims to introduce the fundamental concepts of prodrugs, chemical delivery systems, and polymeric prodrugs, with emphasis on their types, structures, and mechanisms of action. - It focuses on drug targeting strategies, combinatorial chemistry, and the design of drug–like molecules using modern synthetic and computational approaches. Additionally, the course provides students with practical insight into high–throughput and virtual screening techniques to support rational drug discovery and development.
9. Teaching and Learning Strategies	
Strategy	1–lectures included multimedia lectures 2– power point presentation 3– practical work

		4– open discussion 5– class activity 6–Self learning			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1–3	6	Students will understand the basic concept and purpose of prodrugs, recognize cleavable covalent bonds used in prodrug design, identify different functional groups modified in prodrugs and classify the main types of prodrugs	Basic concept of prodrugs; Covalent bonds (cleavable); Prodrugs of functional groups; Types of prodrugs.	1–lectures included multimedia lectures 2– power point presentation 3– open discussion 5– class activity	1–written exam 2– Quiz 3–midterm exam 4– final exam
4–6	6	Students will explain the role of chemical delivery systems in drug delivery, understand the types and structural features of polymers used in drug delivery, describe the concept and applications of polymeric prodrug and identify cross–linking reagents and their function in polymer systems	Chemical delivery systems; Polymeric prodrugs; Types and structure of polymers; Cross–linking reagents.	6–Self learning	

7-8.	4	Students will explain the basic principles of drug targeting	Drug targeting.		
9	2		Project.		
10-12	6	Students will understand the principles of combinatorial chemistry in drug discovery, recognize the role of peptides and linear structures in drug design, identify the key properties of drug-like molecules, understand the function of supports and linkers in combinatorial synthesis, and describe solution-phase techniques in combinatorial chemistry	Combinatorial chemistry; Peptides and other linear structures; Drug like molecules; Support and linker; Solution-phase combinatorial chemistry		
13-15	6	students will understand the concept of high-throughput screening in drug discovery, explain the role of virtual screening in modern drug design and understand the importance of chemical diversity in library design	High-throughput screening; Virtual screening; Chemical diversity and library design		
11. Course Evaluation					
Written exam 70 marks					

Midterm 20 marks

Course work 10 marks

Total =100 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Wilson and Gisvold Textbook of Organic medicinal and Pharmaceutical chemistry, Delgado JN, Remers WA, (Eds); 10th ed
Main references (sources)	Wilson and Gisvold Textbook of Organic medicinal and Pharmaceutical chemistry, Delgado JN, Remers WA, (Eds); 10th ed
Recommended books and references (scientific journals, reports...)	Scientific journals in basic specializations
Electronic References, Websites	Websites of Arab and foreign universities and pharmaceutical companies

Course Description Form

1. Course Name:	
Advanced pharmaceutical Analyses	
2. Course Code:	
PH5204	
3. Semester / Year:	
Second semester/ Fifth level	
4. Description Preparation Date:	
21/1/2025	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3x15= 45 hrs (theoretical) 2x15=30 hrs (practical) /number of units = 4	
7. Course administrator's name (mention all, if more than one name)	
Name: Mohamed Mohamed Shahin Email: Mohamed .shahin@777outlook.com	
8. Course Objectives	
Course Objectives	advanced pharmaceutical analysis course aims to equip students with comprehensive knowledge and practical skills in various analytical techniques essential for the pharmaceutical industry. The course covers UV-Visible spectroscopy, IR spectroscopy, HPLC, mass spectroscopy, and elemental analysis, emphasizing the

	principles, applications, and operational aspects. Students will learn to analyze and interpret spectral data, develop and validate analytical methods, and ensure the quality and safety of pharmaceutical products. The course fosters critical thinking, problem-solving, and effective communication, preparing students for professional roles in pharmaceutical research and quality control.
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9. Teaching and Learning Strategies

Strategy	1-lectures included multimedia lectures 2- power point presentation 3- practical work 4- open discussion 5- class activity 6-Self learning 7- Brain storming 8- Role play
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10. Expected learning outcomes

A) Knowledge

4. Statement of the knowledge and basic principles in chemistry, Learning using different scientific techniques for synthesis, analysis and how to deal with organic and inorganic chemical compounds and their reactions	4.1 Knowledge of the methods used in the preparation of organic compounds. 4.2 Enhancing students' ability to think and analyze effectively. 4.3. Understanding the fundamental concepts of different inorganic pharmaceutical chemistry and uses of different inorganic pharmaceutical compounds 4.4. Explain the principles and applications of UV-Visible spectroscopy, IR spectroscopy, HNMR, mass spectroscopy, and elemental analysis in pharmaceutical analysis.
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	4.5 Describe the theoretical background and operational aspects of each analytical technique 4.6 How to identify the chemical compounds of drugs through pharmaceutical analyses 4.7 How to identify and classify medicines 4.8 How to name organic compounds and understand different types of organic reaction
B) Skills	
4. Conducting practical experiments and enabling the students to use the instruments and laboratory devices.	4.1 How to deal with scientific equipment 4.2 Acquisition of skill in preparing compounds and medicines 4.3 Acquisition of skill in the use of different methods in the manufacture and preparation of medicines 4.4 Using the literature to write a report on the data of a particular experiment. 4.5 Acquire the skill of safe handling of chemicals and glassware. 4.6 Acquire skill in implementing chemical diagnosis methods for chemical substances 4.7 Equalization of skill in preparing vehicles and medicines 4.8 developing the ability to analyze and interpret chemical data, perform quantitative and qualitative analyses, and use various analytical techniques. 4.9 Gaining proficiency in laboratory techniques, including safe handling of chemicals, preparation of solutions, and use of laboratory equipment.

	4.10 Enhancing the ability to solve complex chemical problems, design experiments, and troubleshoot experimental issues. 4.11. Perform accurate and precise measurements using UV–Visible, IR, HNMR, and mass spectrometers. 4.12. Develop and validate analytical methods for the quality control of pharmaceuticals. 4.13. Communicate analytical findings effectively through written reports and presentations. 4.14. Work collaboratively in a laboratory setting to solve complex analytical problems.
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C) Ethics

1. Dealing with patients in accordance with pharmacy ethics through maintaining the security, safety and privacy of the patient.
2. Developing students' sense of responsibility during the period of study and work.
3. Enhancing the spirit of cooperation and teamwork among students
4. Applying ethical theories, rules, guidelines and laws governing scientific conducts

11. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	6	A4.4, A4.5, B4.11, B4.12, B13, C2.	UV / visible spectroscopy; Sample handling and instrumentation; Characteristic absorption of organic compounds; Rules for calculation of lambda max and application; Application of	1–lectures included	1–Assignment
2				multimedia lectures 2– power point presentation 3– practical work	2– Quiz 3–midterm exam 4– Practical exam 5– final exam

2			UV/visible; spectroscopy; Problems and solutions.	4- open discussion 5- class activity 6-Self learning 7- Brain storming	
2	14	A4.4, A4.5, B4.11, B4.12, B13, C2	Infra-Red spectroscopy (theory and H-bonding effect; Sampling techniques and interpretation spectra; Characteristic group frequencies of organic compounds; Application of IR spectroscopy; Problems and solutions.	8- Role play	
2					
2					
2					
2					
2					
2	12	A4.4, A4.5, B4.11, B4.12, B13, C2	¹ H -Nucleomagnetic Resonance (NMR) and ¹³ C-NMR spectroscopy; Introduction to the nature of NMR absorption, chemical shifts and factors affecting them, information obtained from NMR spectra, more complex spin-spin splitting patterns, application of ¹ H-NMR spectroscopy; ¹³ C-NMR spectroscopy: introduction and characteristics, DEPT ¹³ C-NMR spectroscopy		
2					
2					
2					
2					
2					
2	12	A4.4, A4.5, B4.11, B4.12, B13, C2	Mass spectroscopy: Introduction and interpreting Mass spectra		
2					

2			fragmentation patterns, Mass behavior of some common functional groups.		
2					
2					
2					
2	2	A4.4, A4.5, B4.11, B4.12, B13, C2	elemental microanalysis CHNS		

Laboratory Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name
1	2	A4.2, A4.4, B4.1, B4.4, B4.5, B4.6, B4.7, C2	Basic definitions and rules
2-3	4	A4.2, A4.4, B4.1, B4.4, B4.5, B4.6, B4.7, C2	Colorimetry and spectrophotometry (Single component analysis of KMnO ₄)
4-5	4	A4.2, A4.4, B4.1, B4.4, B4.5, B4.6, B4.7, C2	Single component analysis of KMnO ₄ (Practical)
6-7	4	A4.2, A4.4, B4.1, B4.4, B4.5, B4.6, B4.7, C2	Two-Component analysis of KMnO ₄ and K ₂ Cr ₂ O ₇
8-9	4	A4.2, A4.4, B4.1, B4.4, B4.5, B4.6, B4.7, C2	Determination of Nifuroxazide in pharmaceutical form using colorimetric spectroscopy
10-11	4	A4.2, A4.4, B4.1, B4.4, B4.5, B4.6, B4.7, C2	Determination of paracetamol in pharmaceutical form using UV. spectroscopy

12– 14	6	A4.2, A4.4, B4.1, B4.4, B4.5, B4.6, B4.7, C2	se HNMR, IR, and Mass Spectrometry to determine the structure of unknown organic compounds. This involves interpreting spectra to identify functional groups and molecular structure
15	2		Exam

12. Course Evaluation

Written exam 60 marks

Midterm 10 marks

Practical exam 10 marks

Collective Theo practical exam 10 marks

Course work 10 marks

Total =100 marks

13. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Organic spectroscopy (NMR, IR, Mass and U S.K. DEWAN
Main references (sources)	Organic spectroscopy (NMR, IR, Mass and U S.K. DEWAN Vogel's quantitative chemical analysis
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
pharmaceutical Analysis	
2. Course Code:	
PH5204	
3. Semester / Year:	
Second semester/ Fifth level	
4. Description Preparation Date:	
2025-2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2x15= 30 hrs (theoretical) /number of units = 2	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Mohamed Mohamed Shahin Email: MohamedShahin.pharma@gmail.com	
8. Course Objectives	
Course Objectives	To study spectrometric methods used for identification and characterization of organic compounds, including UV, IR, MASS and NMR spectroscopy; it enables students to understand the applications of these techniques for qualitative and quantitative analysis of organic compounds.
9. Teaching and Learning Strategies	
Strategy	1-lectures included multimedia lectures 2- power point presentation 3- Brain storming 4- open discussion 5- class activity 6-Self learning 7- Quizzes and assignments

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-3	6	1. Explain the basic theory of IR spectroscopy and how molecules absorb infrared light. 2. Describe the effect of hydrogen bonding on IR absorption bands. 3. Identify common sampling techniques used in IR spectroscopy (e.g., KBr pellets, ATR). 4. Interpret IR spectra by recognizing key peaks and patterns. 5. Recognize characteristic group frequencies of major organic functional groups (e.g., OH, C=O, NH). 6. List important applications of IR spectroscopy in pharmaceutical and chemical analysis.	Infrared spectroscopy: Theory and H-bonding effect; Sampling techniques and interpretation of spectra; Characteristic group frequencies of organic compounds; Applications of IR spectroscopy.	1-lectures included multimedia lectures 2- power point presentation 3- open discussion 5- class activity 6-Self learning	1-written exam 2- Quiz 3-midterm exam 4- final exam
4-7	8	1. Define ^1H -NMR spectroscopy and its basic principles. 2. Explain the concept of nuclear spin and how it relates to NMR absorption.	^1H -Nuclear Magnetic Resonance (NMR) spectroscopy: Introduction, Nuclear spin; the nature of NMR absorption;		

		3. Describe chemical shifts, shielding, and magnetic anisotropy. 4. Interpret NMR spectra using integration and spin-spin splitting patterns. 5. Understand the meaning of the coupling constant and what it reveals about molecular structure. 6. List common applications of ^1H-NMR in pharmaceutical and chemical analysis.	chemical shifts and shielding; Magnetic anisotropy; Integration; spin-spin splitting patterns; Coupling constant; applications of ^1H-NMR spectroscopy.		
8	2	1. Define ^{13}C-NMR spectroscopy and its basic principles. 2. Explain the concept of chemical shift in carbon-13 spectra. 3. Describe the purpose of proton decoupling in simplifying spectra. 4. Understand the use of DEPT (Distortionless Enhancement by Polarization Transfer) in identifying different types of carbon atoms (CH_3, CH_2, CH, quaternary C). 5. Interpret simple ^{13}C-NMR spectra for	^{13}C-NMR spectroscopy: Introduction; Chemical shift; proton decoupling; DEPT ^{13}C-NMR spectroscopy.		

		structural analysis of organic compounds.			
9–11	5	1. Explain the basic principles of UV–Visible absorption spectroscopy. 2. Describe the main parts of a UV spectrophotometer and how it works. 3. Define chromophores and conjugation, and their effect on absorption. 4. Identify the characteristic UV absorption of dienes and enones. 5. Understand how solvents influence UV spectra. 6. List common applications of UV spectroscopy in pharmaceutical and chemical analysis.	UV spectroscopy: Instrumentation and principles of absorption spectroscopy; Chromophore and conjugation; Characteristic absorption of dienes and enones; Solvent effect; Applications of UV spectroscopy.		
11–15	9	1. Explain the basic theory behind mass spectrometry and how it works. 2. Describe different sample introduction techniques used in mass spectrometers. 3. Identify common ionization methods (e.g.,	Mass spectroscopy: Basic theory; Sample introduction; Ionization methods; Mass analysis; Determination of molecular weight & Formula; fragmentation and		

	EI, ESI, MALDI). 4. Understand how ions are separated and detected during mass analysis. 5. Determine the molecular weight and molecular formula from a mass spectrum. 6. Interpret fragmentation patterns to deduce structural information about organic compounds.	structure analysis.		
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11. Course Evaluation

Written exam 70 marks

Midterm 20 marks

Course work 10 marks

Total =100 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to Spectrometry by D. Pavia, G. Lampman, G. Kriz, and J. Vyvyan, 5th edition, 2014
Main references (sources)	Spectrometric Identification of Organic Compounds by Silverstein, Bassler and Morrill; 8th edition, 2014.
Recommended books and references (scientific journals, reports.)	Organic spectroscopy (NMR, IR, Mass and UV.) S.K. DEWAN
Electronic References, Websites	NMRdb.org and IntechOpen-IR Spectroscopy Book

Course Description Form

1. Course Name:	
Pharmaceutical biotechnology	
2. Course Code:	
PH5207	
3. Semester / Year:	
Second semester/ fifth year	
4. Description Preparation Date:	
2025–2026	
5. Available Attendance Forms:	
Full–time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
1 hours/week (theoretical) , total units = 1	
7. Course administrator's name (mention all, if more than one name)	
Name: Assist. Lecturer Mays Mazin AL–Hamadanl Email: Mais.yahya@alayen.edu.iq	
8. Course Objectives	
Course Objectives	There will be an introduction to pharmaceutical biotechnological science, along with the types and uses of biotechnological products in medicine. It covers the formulation aspect of biotechnological products into pharmaceutical dosage form and the methods of administration, what are the obstacles, and how to overcome them. Moreover, it covers studying pharmacokinetics of biotechnological products inside the human body.
9. Teaching and Learning Strategies	
Strategy	Lectures and Presentation, Interactive discussions related photos and videos, brainstorm, and Inverted classrooms with learning strategies
10. course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1	Understand fundamentals biotechnology and applications in field of pharmaceutical preparations	Introduction to biotechnology	smartboard/ Presentation Slides /Discussion	oral questions and written exams
2	1	Describe biotechnological techniques in drug formulation	Formulation of pharmaceutical biotechnology	smartboard/ Presentation Slides /Discussion	oral questions and written exams
3	1	Identify and explain components parenteral dosage forms	The components of parenteral dosage form	smartboard/ Presentation Slides /Discussion	oral questions and written exams
4	1	Identify and explain the components of parenteral dosage forms	The components of parenteral dosage form	smartboard/ Presentation Slides /Discussion	oral questions and written exams
5	1	Understand and apply	Protein delivery: Parenteral administration	smartboard/ Presentation Slides /Discussion	oral questions and written exams

		parenteral administration strategies for protein delivery			
6	1	Describe Alternative routes of drug administration,	Alternative routes of Administration: Cos and pros for the alternative route of administrations	smartboard/ Presentation Slides /Discussion	oral questions and written exams
7	1	Understand strategies improve oral drug delivery	Improvement of oral route and minimizing the obstacles	smartboard/ Presentation Slides /Discussion	oral questions and written exams
8	1	Understand biotechnological production insulin.	The production of insulin via biotechnology	smartboard/ Presentation Slides /Discussion	oral questions and written exams
9	1	Study vaccine composition and the role of adjuvants enhancing efficacy.	Method to produce vaccines	smartboard/ Presentation Slides /Discussion	oral questions and written exams
10	1	Understand pharmacokinetics of peptide drugs.	Pharmacokinetics of protein therapies	smartboard/ Presentation Slides /Discussion	oral questions and written exams

11	1	Understand distribution mechanisms and volumes of distribution therapeutic proteins,	Distribution mechanisms and volumes of distribution for kinetics Drug from therapeutic proteins–Receptor–mediated distribution	smartboard/ Presentation Slides /Discussion	oral questions and written exams
12	1	Understand proteolysis and elimination protein therapies from body.	–Proteolysis –Release protein therapies from the body	smartboard/ Presentation Slides /Discussion	oral questions and written exams
13	1	Describe Renal protein metabolism and secretion processes.	Renal protein metabolism and secretion processes	smartboard/ Presentation Slides /Discussion	oral questions and written exams

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Pharmaceutical Biotechnology Fundamentals and Applications, Third Edition Edited By Daan J. A. Crommelin, Robert D. Sindelar, Bernd Meibohm Copyright 2008
Main references (sources)	Pharmaceutical Biotechnology Fundamentals and Applications, Third Edition Edited By Daan J. A. Crommelin, Robert D. Sindelar, Bernd Meibohm Copyright 2008
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Pharmacoeconomics	
2. Course Code:	
PH5201	
3. Semester / Year:	
Second semester/ fifth	
4. Description Preparation Date:	
2025–2026	
5. Available Attendance Forms:	
Full-time and official attendance hours	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hr x 15 weeks = 30 hrs/ 2units	
7. Course administrator's name (mention all, if more than one name)	
Name: Ammar Mohammed Atiyah Email: Ammar.atiyah@alayen.edu.iq	
8. Course Objectives	
Course Objectives	The aim of this course is to introduce students to the principles of pharmacoeconomics and its role in supporting healthcare decision-making, to develop their ability to measure healthcare costs and compare different economic evaluation methods, and to analyze pharmacoeconomic studies and apply decision-making models. In addition, the course focuses on evaluating health-related quality of life and pharmacy services, enhancing critical appraisal skills, and emphasizing ethical considerations in healthcare economics, thereby contributing to improved health outcomes and cost containment.
9. Teaching and Learning Strategies	
Strategy	1–lectures included multimedia lectures 2– power point presentation 3– practical work 4– open discussion

10. Course Structure					
Week	Hrs.	Required learning objectives	Unit/Module or Topic Title	Teaching methods	Assessment methods
1.	4	Explain the fundamental concepts and principles of pharmacoeconomics and their role in healthcare decision-making. Identify and differentiate types of healthcare costs, including direct, indirect, and intangible costs, with relevant examples. Describe the ECHO model and explain its application in evaluating clinical, economic, and humanistic patient outcomes. Explain and distinguish among the four main pharmacoeconomic analysis methods, including cost-minimization, cost-effectiveness, cost-utility, and cost-benefit analyses.	Overview of Pharmacoeconomics and principles	- Whiteboard and PowerPoint and data show presentation - Class discussion - Presentation of cases - Handouts - Visual aids: Utilize visual aids such as pictures, charts, graphs, diagrams	- Short MCQs - Oral exam and direct questions in the class - Midterm exam - Electronic exams on the electronic platform - Final exam
2.	2	Explain methods used to measure and estimate healthcare costs in pharmacoeconomic evaluations. Differentiate between data sources used for cost estimation, including patient-level data, databases, and literature sources. Apply basic cost estimation principles to simple pharmacoeconomic examples.	Measuring and estimating costs.		
3.	2	Identify different types of consequences (outcomes) used in pharmacoeconomic evaluations, including	Measuring and estimating consequences		

		clinical, economic, and humanistic outcomes. 2. Describe methods used to measure and estimate consequences, such as clinical endpoints, quality-of-life measures, and utility values. 3. Apply basic outcome measurement principles to simple pharmacoeconomic examples.			
4.	2	1. Define cost-minimization analysis and identify situations in which it is appropriately applied. 2. Explain the key assumption of equivalent clinical outcomes required for conducting cost-minimization analysis. 3. Apply cost-minimization analysis to compare alternative healthcare interventions and identify the least costly option.	Cost-minimization analysis		
5.	2	1. Define cost-effectiveness analysis and explain its role in healthcare decision-making. 2. Identify appropriate clinical outcome measures used in cost-effectiveness analysis, such as life-years gained or cases prevented. 3. Interpret and apply cost-effectiveness results, including incremental cost-effectiveness ratios (ICERs), to compare healthcare interventions.	Cost-effectiveness analysis		
6.	2	1. Define cost-utility analysis and explain how it differs from other	Cost-utility analysis		

		pharmacoeconomic evaluation methods. 2. Describe utility-based outcome measures, including quality-adjusted life years (QALYs). 3. Interpret cost-utility results, including incremental cost-utility ratios (ICURs), to compare healthcare interventions.			
7.	2	1. Define cost–benefit analysis and explain its role in economic evaluation of healthcare interventions. 2. Describe methods used to assign monetary values to health outcomes in cost–benefit analysis. 3. Interpret cost–benefit results, including net benefit and benefit–cost ratio, to support healthcare decision-making.	Cost benefits analysis		
8.	2	1. Define health-related quality of life (HRQoL) and explain its importance in healthcare and pharmacoeconomic evaluations. 2. Identify common domains and instruments used to measure HRQoL, including generic and disease-specific tools. 3. Explain how HRQoL data are used in pharmacoeconomic analyses, particularly in cost-utility analysis and quality-adjusted life year (QALY) calculations.	Health–related. quality of life.		
9.	2	1. Explain the principles of decision analysis and its role in healthcare and pharmacoeconomic evaluations.	Decision analysis		

		2. Describe the structure and components of decision trees, including decision nodes, chance nodes, probabilities, and outcomes. 3. Apply basic decision analysis techniques to compare alternative healthcare interventions under conditions of uncertainty.			
10.	2	1. Explain the principles and applications of Markov modeling in pharmaco-economic and health outcomes research. 2. Describe the use of retrospective databases for economic and outcomes evaluations, including their strengths and limitations.	Markov modeling, Retrospective databases		
11	2	1. Define pharmacy services within a pharmaco-economic framework and explain their role in efficient healthcare resource utilization. 2. Describe the economic impact of pharmacy services on healthcare costs, clinical outcomes, and patient quality of life. 3. Identify methods used to evaluate the cost-effectiveness and value of pharmacy services.	Pharmacy services.		
12	2	1. Explain the meaning of epidemiology and discuss its fundamental terms and concepts. 2. Recognize the main sources of epidemiologic data.	Introduction to pharmacoepidemiology		

		3. Explain basic approaches to data collection and interpretation in epidemiologic research.			
13	4	Cost-Effectiveness project can be assigned to teach students how to understand the terminologies used in published Pharmacoeconomic studies.	Project discussion		

11. Course Evaluation

Written exam 70 marks

Midterm 20 marks

Course work 10 marks

Total =100 marks

12. Learning and Teaching Resources

Required textbooks (curriculum books, if any)	1–Bootman JL, Townsend RJ, McGhan WF, (Eds.), Principles of Pharmacoeconomics, Harvey Whitney Books Company, Cincinnati 2–Rachel Elliot and Katherine Payne .Essential of economic evaluation in healthcare. 2005 pharmaceutical press. 3–Karen L.Rascati. Eessentials of Pharmacoeconomics. copyright 2009 Lippincott Williams and Wilkins.
Main references (sources)	1–Bootman JL, Townsend RJ, McGhan WF, (Eds.), Principles of Pharmacoeconomics, Harvey Whitney Books Company,
Recommended books and references (scientific journals, reports...)	Value in Health Journal Value in Health Journal Regional Issues
Electronic References, Websites	Internet PowerPoint Presentations