Kafr el-Sheikh university
Faculty of Pharmacy
Pharm-D program
Course Specification
2025/2026

Pharm-D program
Course Specification
2025/2026
Third Level
First Semester

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Kafrelsheikh University

Faculty of Pharmacy

جامعة كفر الشيخ
كلية الصيدلة

Course Specification
(2025)

1. Basic Information

Course Title (according to the bylaw)	Biochemistry II			
Course Code (according to the bylaw)	PB 503			
Department/s participating in delivery of the course	Biochemistry Department			
Number of credit hours/points of the course (according to the bylaw)	Theoretical	Practical	Other (specify)	Total
	2	1		3
Course Type	Compulsory			
Academic level at which the course is taught	Third level			
Academic Program	BSc in Pharmacy (Pharm D)			
Faculty/Institute	Faculty of Pharmacy			
University/Academy	Kafrelsheikh university			
Name of Course Coordinator	Dr\ Shimaa Ali			
Course Specification Approval Date	9-2025			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department council			

2. Course Overview (Brief summary of scientific content)

Upon successful completion of this course, the students will develop various competencies based on covering the following general outlines:
Mobilization of body stores of glycogen and fats, Metabolism and tissue utilization of glucose, amino acids, and fatty acids, Regulation of blood glucose level and clinical correlations, Feed/fast cycle, Nitrogen metabolism and nitrogen balance, Inborn errors of metabolism, Second messengers and signal transduction, Biochemistry of cancer, and aging, Food biochemistry (milk – probiotics), Oxidative stress and body defence mechanisms

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
Domain 1 (FUNDAMENTAL KNOWLEDGE) 1-1- COMPETENCY		**Upon finishing this course, learn key metabolic and biosynthetic pathways and how the pathways are regulated and connected. Learn about methods used for studying biochemical pathways, improve problem-solving and independent thinking ability, and improve the ability to communicate through written and oral communication This competency will be developed via the following key elements:**	
1.1.1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	1.1.1	Describe how the body gets energy from metabolism and define the citric acid cycle as an amphibolic pathway.
		1.1.2	Define the catabolic and anabolic pathways of glucose, glycogen, amino acids and lipids and their regulation.
		1.1.3	Explain the basis of the feed/fast cycle, diabetes mellitus, obesity, and inborn errors of metabolism.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
		1.1.4	Recognize types of ligands and receptors for cellular signaling and identify different types and sources of free radicals and antioxidants, and different components of milk and milk adulterants.
DOMAIN 2: PROFESSIONAL AND ETHICAL PRACTICE **2-3- COMPETENCY**		**Upon finishing this course, students will be able to handle and dispose of biological material and chemicals effectively and safely with respect to relevant laws and legislations.** **This competency will be developed via the following key elements:**	
2-3-1	Handle, identify, and dispose biologicals, synthetic/natural materials, biotechnology-based and radio-labeled products, and other materials/products used in pharmaceutical fields.	**2-3-1**	Safely handle different chemicals to avoid harm to the students.
		2-3-2	Recognize and adopt ethical, legal, and safety guidelines for handling and disposal of biological and pharmaceutical materials/products
		2-3-3	Handle and dispose of biological samples safely to avoid harm to individuals and the environment according to safety guidelines.
Domain 3: Pharmaceutical Care **3-1-COPETENCY**		**Upon finishing this course, students will be able to apply the principles of biochemistry in understanding normal body functions to improve healthcare services using evidence-based information.** **This competency will be developed via the following key elements:**	
3-1-1	Relate the normal and abnormal body functions based on biochemistry to manage	**3-1-1**	Explain the biochemical basis of normal cellular and systemic functions and their regulatory mechanisms.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	different disorders and diseases to improve health care services.	**3.1.2**	Correlate biochemical abnormalities with the development and progression of common diseases and disorders.
		3.1.3	Apply biochemical knowledge to interpret clinical data for diagnosis, prognosis, and management to improve health care services.
Domain 4: Personal Practice **4-2- Competency**		**Upon finishing this course, students will be able to Effectively communicate verbally, non-verbally and in writing with individuals and communities.** **This competency will be developed via the following key elements:**	
4-2-2	Use contemporary technologies and media to demonstrate effective presentation skills	**4.2.1**	Utilize digital tools and contemporary technologies to design clear, engaging, and professional presentations.
		4.2.2	Apply critical thinking and creativity in delivering scientific and professional content.
Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
1.1.1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	**1.1.1**	Identify the principle role of biochemistry in understanding normal body functions.
DOMAIN 2: PROFESSIONAL AND ETHICAL PRACTICE **2-3- COMPETENCY**		**Upon finishing this course, students will be able to handle and dispose biological material and chemicals effectively and safely with respect to relevant laws and legislations.** **This competency will be developed via the following key elements:**	
2-3-1	Handle, identify, and dispose biologicals, synthetic/natural materials, biotechnology-based	**2-3-1**	Safely handle different chemicals to avoid their harm to the students.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	and radio-labeled products, and other materials/products used in pharmaceutical fields.		
2-3-2	Recognize and adopt ethical, legal, and safety guidelines for handling and disposal of biologicals, and pharmaceutical materials/products	2-3-2	Handle, and dispose biological samples and chemicals safely to avoid their harm to individuals and environment according to safety guidelines.
Domain 3: Pharmaceutical Care **3-1-COPETENCY**		**Upon finishing this course, students will be able to apply the principles of biochemistry in understanding normal body functions to improve health care services using evidence-based information.** **This competency will be developed via the following key elements:**	
3-1-1	Relate the normal and abnormal body functions based on biochemistry to manage different disorders and diseases to improve health care services.	3-1-1	Relate the normal and abnormal body functions based on biochemistry to manage different disorders and diseases to improve health care services.
Domain 4: Personal Practice **4-2- Competency**		**Upon finishing this course, students will be able to Effectively communicate verbally, non-verbally and in writing with individuals and communities.** **This competency will be developed via the following key elements:**	
4-2-2	Use contemporary technologies and media to demonstrate effective presentation skills	4.2.1	Perform a presentation on the advanced topical drug delivery systems and their benefits.
		4.2.2	effective presentation skills in Acquire modern technology and media to create engaging and memorable experiences. This includes using interactive slides, incorporating multimedia (videos, images, audio), and employing tools for real-time feedback and collaboration. By integrating these elements, student can enhance audience

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
			engagement, clarify complex information, and leave a lasting impact.

4. Teaching and Learning Methods

1- Lectures

2- E-learning

3- Practical training/ laboratory

4- Class activity

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical /Clinical/ .....)	Self-learning (Tasks/ Assignments/ Projects/ ...)	Other (to be determined)
1	Mobilization of body stores of glycogen and fats	**4**	**2**	**2**		
2	Metabolism and tissue utilization of glucose	**4**	**2**	**2**		
3	Metabolism and tissue utilization of amino acids	**4**	**2**	**2**		
4	Metabolism and tissue utilization of fatty acids	**4**	**2**	**2**		
5	Regulation of blood glucose clinical correlations level and	**4**	**2**	**2**		
6	Feed/fast cycle	**4**	**2**	**2**		
7	**Mid-term exam**					
8	Nitrogen metabolism and nitrogen balance	**4**	**2**	**2**		

9	Inborn errors of metabolism	**4**	**2**	**2**		
10	Inborn errors of metabolism (Cont.)	**4**	**2**	**2**		
11	Second messengers and signal transduction	**4**	**2**	**2**		
12	Biochemistry of cancer	**4**	**2**	**2**		
13	Biochemistry of aging	**4**	**2**	**2**		
14	Food biochemistry (milk – probiotics)	**4**	**2**	**Practical exam**		
15	Oxidative stress and body defence mechanisms	**4**	**2**	**Practical exam**		

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (Semester work)	3	10	%10
2	Final Written Exam	17-16	50	%50
3	Final Practical/Clinical/… Exam	15-14	25	%25
4	Final Oral Exam	17-16	10	%10
5	Assignments / Project /Portfolio/ Logbook	9,6,3	5	%5

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	1- **Abali, Emine Ercikan, et al.** ***Lippincott® illustrated reviews: biochemistry*****. Lippincott Williams & Wilkins, 2025.** 2- Harper's illustrated Biochemistry by Murray RK, Bender DA, Botham KM, Kennelly PJ, Rodwell VW, P. Anthony Weil PA (2018), 31th Edition, McGraw Hill. 3- Essential Biochemistry: Pratt CW and Cornely K (2017), 4th edition John Wiley &Sons Inc., USA.
	Other References	1- Notes in Biochemistry II by staff-members of department of Biochemistry. 2- Lab Notes in Biocemistry II by staffmembers of department of Biochemistry
	Electronic Sources (Links must be added)	http://www.freescience.info/Biology.php. www.highwire.com, www.google.com, www.pubmed.com & www.biomed.net http://www.emc.maricopa.edu/faculty/farabee/BIOBK/BioBookTOC.html

	Learning Platforms (Links must be added)	https://lms3.kfs.edu.eg/pharm/login/index.php
	Other (to be mentioned)	-- --
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	SPECTROPHOTOMETER
	Supplies	- Class rooms. - Library - Data show - Computers. – Internet. - Smart board
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	**praxi lab**
	Other (to be mentioned)	

Course Plan

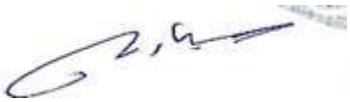
Week	Topic	Key Elements	Teaching & Learning Methods	Student Assessment Methods
1	Mobilization of body stores of glycogen and fats	1.1.1, 1.1.2, 1.1.3, 1.1.4, 2.3.1, 2.3.2, 2.3.3, 3.1.1, 3.1.2, 3.1.3,4.2.1, 4.2.2	Lectures, and E-learning	Written and oral exams
2	Metabolism and tissue utilization of glucose	1.1.1, 1.1.2, 1.1.3, 1.1.4, 2.3.1, 2.3.2, 2.3.3, 3.1.1, 3.1.2, 3.1.3,4.2.1, 4.2.2	Lectures, E-learning and practical training	Written, practical and oral exams
3	Metabolism and tissue utilization of amino acids	1.1.1, 1.1.2, 1.1.3, 1.1.4, 2.3.1, 2.3.2, 2.3.3, 3.1.1, 3.1.2,	Lectures, E-learning and practical training	Written, practical and oral exams

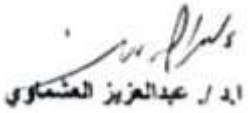
		3.1.3,4.2.1, 4.2.2		
4	Metabolism and tissue utilization of fatty acids	1.1.1, 1.1.2, 1.1.3, 1.1.4, 2.3.1, 2.3.2, 2.3.3, 3.1.1, 3.1.2, 3.1.3,4.2.1, 4.2.2	Lectures, and E-learning	Written, and oral exams
5	Regulation of blood glucose level and clinical correlations	1.1.1, 1.1.2, 1.1.3, 1.1.4, 2.3.1, 2.3.2, 2.3.3, 3.1.1, 3.1.2, 3.1.3,4.2.1, 4.2.2	Lectures, and E-learning	Written, and oral exams
6	Feed/fast cycle	1.1.1, 1.1.2, 1.1.3, 1.1.4, 2.3.1, 2.3.2, 2.3.3, 3.1.1, 3.1.2, 3.1.3,4.2.1, 4.2.2	Lectures, and E-learning	Written, and oral exams
7	**Mid-term exam**			
8	Nitrogen metabolism and nitrogen balance	1.1.1, 1.1.2, 1.1.3, 1.1.4, 2.3.1, 2.3.2, 2.3.3, 3.1.1, 3.1.2, 3.1.3,4.2.1, 4.2.2	Lectures, E-learning and practical training	Written, practical and oral exams
9	Inborn errors of metabolism	1.1.1, 1.1.2, 1.1.3, 1.1.4, 2.3.1, 2.3.2, 2.3.3, 3.1.1, 3.1.2, 3.1.3,4.2.1, 4.2.2	Lectures, and E-learning	Written, and oral exams

10	Inborn errors of metabolism (Cont.)	1.1.1, 1.1.2, 1.1.3, 1.1.4, 2.3.1, 2.3.2, 2.3.3, 3.1.1, 3.1.2, 3.1.3,4.2.1, 4.2.2	Lectures, and E-learning	Written, and oral exams
11	Second messengers and signal transduction	1.1.1, 1.1.2, 1.1.3, 1.1.4, 2.3.1, 2.3.2, 2.3.3, 3.1.1, 3.1.2, 3.1.3,4.2.1, 4.2.2	Lectures, and E-learning	Written, and oral exams
12	Biochemistry of cancer	1.1.1, 1.1.2, 1.1.3, 1.1.4, 2.3.1, 2.3.2, 2.3.3, 3.1.1, 3.1.2, 3.1.3,4.2.1, 4.2.2	Lectures, and E-learning	Written, and oral exams
13	Biochemistry of aging	1.1.1, 1.1.2, 1.1.3, 1.1.4, 2.3.1, 2.3.2, 2.3.3, 3.1.1, 3.1.2, 3.1.3,4.2.1, 4.2.2	Lectures, and E-learning	Written, and oral exams
14	Food biochemistry (milk – probiotics)	1.1.1, 1.1.2, 1.1.3, 1.1.4, 2.3.1, 2.3.2, 2.3.3, 3.1.1, 3.1.2, 3.1.3,4.2.1, 4.2.2	Lectures, and E-learning	Written, and oral exams
15	Oxidative stress and body defence mechanisms	1.1.1, 1.1.2, 1.1.3, 1.1.4, 2.3.1, 2.3.2, 2.3.3, 3.1.1, 3.1.2,	Lectures, and E-learning	Written, and oral exams

		3.1.3,4.2.1, 4.2.2		

Name and Signature Course Coordinator Dr. Shaimaa Ali	Name and Signature Program Coordinator





Kafrelsheikh University

Faculty of Pharmacy

جامعة كفر الشيخ

كلية الصيدلة

Course Specification
(2025)

1. Basic Information

Course Title (according to the bylaw)	**Pharmaceutical microbiology**			
Course Code (according to the bylaw)	**PM 503**			
Department/s participating in delivery of the course	**Microbiology and Immunology**			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2	**1**	**----**	**3**
Course Type	**Compulsory**			
Academic level at which the course is taught	**third level, semester (1)**			
Academic Program	**BSc in Pharmacy (Pharm D)**			
Faculty	**Pharmacy**			
University	**Kafer El-sheikh Univeristy**			
Name of Course Coordinator	**Prof. Dr. Ramadan Eldomany**			
Course Specification Approval Date	**9/2025**			
Course Specification Approval	**Department council**			

2. Course Overview (Brief summary of scientific content)

This course describes in detail the physical and chemical methods of bacterial eradication and how to effectively control microbial growth in the field of pharmaceutical industry / hospitals. It further describes the means of preservation of pharmaceutical products, as well as cosmetics. Sterilization, sterilization indicators, sterility testing, aseptic area. Moreover, it explains the different groups of antimicrobials, their mechanism of action and resistance of microbes to biocides. Microbiological evaluation of antiseptics, disinfectants and preservatives. Antibiotics, classification and mechanism of action, Antiviral and antifungal agents, different classes of antibiotics including the new categories and new approaches to overcome bacterial resistance & antibiotics clinical abuse.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
Domain 1 (FUNDAMENTAL KNOWLEDGE) 1-1- COMPETENCY		**Upon finishing this course, students will be able to integrate knowledge from basic and applied pharmaceutical and clinical sciences to know about microorganisms and antibiotics.** **This competency will be developed via the following key elements:**	
1.1.1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	**1.1.1**	Discuss the different classes of antibiotics, and non-antibiotics antimicrobial agents.
		1.1.2	Explain social and behavioral factors affecting the proper use of antibiotics.
		1.1.3	Demonstrate microbiological sciences to validate sterilization techniques, quality of antimicrobial agents and avoid microbial spoilage.
1.1.6		**1.1.4**	Integrate knowledge from fundamental pharmaceutical and medical sciences to

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	Utilize scientific literature and collect and interpret information to enhance professional decisions.		explain the antibiotic mechanism of action and resistance
		1.1.5	Utilize Principles of pharmaceutical microbiology and determine antimicrobial dosage, antibiotic combination.
DOMAIN 2: PROFESSIONAL AND ETHICAL PRACTICE 2-2- COMPETENCY		**Upon finishing this course, students will be able to apply pharmaceutical microbiology principles to ensure microbial limit compliance of raw materials and finished products, validate aseptic and preservative systems in formulation and manufacturing, and participate in microbiologically sound systems for dispensing, storage, and distribution of medicines. This competency will be developed via the following key elements:**	
2.2.2	Apply the basic requirements of quality management system in developing,---manufacturing, analyzing, storing, and distributing pharmaceutical materials/ products considering-various incompatibilities.	**2.2.1**	Apply international guidelines of GMP, QC and QA in sterilization of pharmaceutical material handling, and storage.
		2.2.2	Integrate essential knowledge with manufacturing and storing of antimicrobials.
		2.2.3	Apply the principles of different techniques of sterilization to operate the pharmaceutical equipment and instruments.
2.2.3	Recognize the principles of various tools and instruments and select the proper techniques for synthesis and analysis of different materials and production of pharmaceuticals.	**2.2.4**	Adopt essential knowledge relevant to good manufacturing practice of pharmaceutical products such as antibiotics and biocides

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
2.2.4	Adopt-the-principles-of pharmaceutical-calculations, biostatistical-analysis, bioinformatics, pharmacokinetics, and biopharmaceutics and their applications in new drug delivery systems,-dose-modification, bioequivalence-studies,-and pharmacy practice.	**2.2.5**	Recognize principles of pharmaceutical calculation for dose modification of antibiotic and non-antibiotic.
2-3- COMPETENCY		**Upon finishing this course, students will be able to apply pharmaceutical microbiology principles to safely handle and dispose of biologicals and pharmaceutical materials/products, ensuring appropriate sterilization, decontamination, and waste management with respect to relevant laws and legislations.** **This competency will be developed via the following key elements:**	
2.3.1	Handle, identify, and dispose biologicals, synthetic/natural materials, biotechnology-based and radio-labeled products, and other materials/products used in pharmaceutical fields.	**2.3.1**	Handle microorganisms and antimicrobials safely and effectively according to relevant laws and legislations.
		2.3.2	Dispose microorganisms and antimicrobials waste safely to avoid the environmental hazards.
2.3.2	Recognize and adopt ethical, legal, and safety guidelines for handling	**2.3.3**	Recognize and adopt safety guidelines for safe and appropriate handling of microorganisms and non-antibiotic antimicrobial agents.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	and disposal of biologicals, and pharmaceutical materials/products.	**2.3.4**	Demonstrate the safe use and storage of the antibiotics to the patient.
2-5- COMPETENCY		**Upon finishing this course, students will be able to participate in research studies and clinical trials that assess antimicrobial activity, resistance patterns, and microbiological safety of pharmaceutical materials.** **This competency will be developed via the following key elements:**	
2.5.1	Fulfill the requirements of the regulatory framework to authorize a medicinal product including quality, safety, and efficacy requirements.	**2.5.1**	Apply microbiological testing for raw materials, in-process controls, and finished products.
2.5.2	Retrieve, interpret, and critically evaluate evidence-based information needed in pharmacy profession.	**2.5.2**	Identify CLSI guidelines for sensitive, intermediate and resistant bacteria to different antibiotics.
		2.5.3	Recognize the significance of results of antibiotic susceptibility testing in relation to patient history.
2.5.3	Contribute in planning and conducting research studies using appropriate methodologies.	**2.5.4**	Propose clear research questions or hypotheses relevant to antimicrobial agent quality, safety, and stability of bacterial and antimicrobial preparation.
Domain 3: Pharmaceutical Care **3-1- Competency**		**Upon finishing this course, students will be able to apply principles of host–pathogen interactions and microbial physiology to improve healthcare services through evidence-based microbiological data.** **This competency will be developed via the following key elements:**	

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
3.1.2	Apply the principles of public health and pharmaceutical microbiology to select and assess proper methods of infection control.	**3.1.1**	Employ the proper use of antimicrobials, prevent microbial resistance and learn about misuse of antibiotics.
3.1.3	Monitor and control microbial growth and carry out laboratory tests for identification of infections/diseases.	**3.1.2**	Apply culture-based and rapid microbiological methods to detect and quantify microorganisms in raw materials, intermediates, and finished products.
3-2- Competency		**Upon finishing this course, students will be able to deliver evidence-based counseling regarding appropriate antimicrobial therapy, resistance prevention, and safe utilization of medical devices, ensuring microbiological safety at both individual and community levels.** **This competency will be developed via the following key elements:**	
3.2.1	Integrate the pharmacological properties of drugs including mechanisms of action, therapeutic uses, dosage, contra-indications, adverse drug reactions and drug interactions.	**3.2.1**	Recognize mechanisms of action of antimicrobials, therapeutic uses, dosage, contra-indications, adverse drug reactions, drug interactions and resistance.
Domain 4: Personal Practice **4-1- Competency**		**Upon finishing this course, students will be able to express leadership, time management, critical thinking, problem solving, independent and team working, creativity and entrepreneurial skills.** **This competency will be developed via the following key elements:**	
4.1.1	Demonstrate responsibility for team performance and peer evaluation of other team members, and express time management skills.	**4.1.1**	Demonstrate critical thinking, problem-solving, creativity, time management and decision-making abilities to choose the appropriate antibiotic.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
4.1.2	Retrieve and critically analyze information, identify and solve problems, and work autonomously and effectively in a team.	**4.1.2**	Communicate efficiently and effectively with other health care team using the proper pharmaceutical and medical terms, abbreviations and symbols.
4-2- Competency		**Upon finishing this course, students will be able to effectively communicate verbally, non-verbally and in writing with individuals and communities.** **This competency will be developed via the following key elements:**	
4.2.2	Use contemporary technologies and media to demonstrate effective presentation skills.	**4.2.1**	Show the ability to effectively present a topic of interest using recent technologies.
4-3- Competency		Upon finishing this course, students will be able to express self-awareness and be lifelong learners for continuous professional improvement. This competency will be developed via the following key elements:	
4.3.1	Perform self-assessment to enhance professional and personal competencies.	**4.3.1**	Collect and analyze information from different sources to determine self merits/ limitations and improve professional and personal skills.
4.3.2	Practice independent learning needed for continuous professional development.	**4.3.2**	Learn independently to develop professional skills.

4. Teaching and Learning Methods

.1- **Lectures** (√)

2- **E-learning** (√)

3- **Practical training/ laboratory** (√)

4- **Class activity** (√)

5- **Seminars** (√)

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	**Training (Practical /Clinical/ .....)**	**Self-learning (Tasks/ Assignments/ Projects/ ...)**	**Other (to be determined)**
1	Introduction & Classification types of Antibiotics.	**4**	**2**	**2**		
2	Mode of action of Antibiotics.	**4**	**2**	**2**		
3	Antibiotic drug combination	**4**	**2**	**2**		
4	Bacterial resistance to antibiotics	**4**	**2**	**2**		
5	Clinical use and missuse of antibiotics.	**4**	**2**	**2**		
6	Microbiological assay of antibiotics.	**4**	**2**	**2**		
7	**Mid-term exam**					
8	Classification of non antibiotic antimicrobial agents, mode of action & Resistance.	**4**	**2**	**2**		
9	Applications of non antibiotic antimicrobial agents &Evaluation.	**4**	**2**	**2**		

10	Microbial contamination of pharmaceutical products & problems	**4**	**2**	**2**		
11	Microbial spoilage of pharmaceutical products	**4**	**2**	**2**		
12	Intoduction to Sterilization and Official methods of sterilization	**4**	**2**	**2**		
13	Validation of Sterilization process.	**4**	**2**	**2**		
14	Microbiological quality of pharmaceuticals	**4**	**2**	**Practical exam**		
15	Aseptic area and testing of pyrogins	**4**	**2**	**Practical exam**		

5. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (formative exam)	**5**		
2	Periodical exam	**7**	**15**	**15%**
3	Final Written Exam	**16, 17**	**50**	**50%**
4	Final Practical Exam	**14, 15**	**25**	**25%**
5	Final Oral Exam	**16, 17**	**10**	**10%**
6	Assignments / Project /Portfolio/ Logbook			
7	Field training			
8	Other (Mention)			

6. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	• Black, J.C., 2017, Microbiology Principles & Applications (10th edition). • Gilmore, Brendan F., and Stephen P. Denyer, eds. Hugo and Russell's pharmaceutical microbiology. John Wiley & Sons, 2023. • Gupta, Meenakshi. "PHARMACEUTICAL MICROBIOLOGY BP 303 T Unit-1 Isolation & Growth Curve of Bacteria."
	Other References	Notes and Lab manual prepared by the department staff.
	Electronic Sources (Links must be added)	www.pubmed.com www.sciencedirect.com
	Learning Platforms (Links must be added)	**https://lms3.kfs.edu.eg/pharm/login/index.php**
	Other (to be mentioned)	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	**Laboratory facilities.**
	Supplies	**Laboratory facilities, microscope, laminar flow & autoclave**
	Electronic Programs	**----**
	Skill Labs/ Simulators	**----**
	Virtual Labs	
	Other (to be mentioned)	▪ **Data show, smart board, Unit for distance learning, Computers, Internet and Library.**

Course Plan

Matrix of course learning outcomes CLOs – Teaching and Learning Strategy and Student Assessment

Course title: Pharmaceutical Dosage Forms-II Course code: PT 404

Course Contents		Key elements	Teaching and Learning Methods	Student Assessment Methods
Week # 1	Introduction & Classification types of Antibiotics.	1.1.1, 1.1.3, 2.2.5, 2.5.2, 4.2.1, 4.3.1, 4.3.2	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 2	Mode of action of Antibiotics.	1.1.4, 1.1.5, 2.2.5, 3.2.1, 4.1.1, 4.1.2, 4.2.1, 4.3.1, 4.3.2	Lectures, E-learning, practical training and class activities, Virtual lab	Written, practical and oral exams
Week # 3	Antibiotic drug combination	1.1.4, 1.1.5, 2.2.5, 2.3.4, 3.2.1, 4.1.1, 4.1.2, 4.2.1, 4.3.1, 4.3.2	Lectures, E-learning, practical training and class activities, Virtual lab	Written, practical and oral exams
Week # 4	Bacterial resistance to antibiotics	1.1.2, 1.1.4, 1.1.5, 2.2.5, 2.5.2, 3.2.1, 4.1.1, 4.1.2, 4.2.1, 4.3.1, 4.3.2	Lectures, E-learning, practical training and class activities, Virtual lab	Written, practical and oral exams
Week # 5	Clinical use and missuse of antibiotics.	1.1.2, 1.1.4, 1.1.5, 2.2.5, 2.3.4, 2.5.2, 3.2.1, 4.1.1, 4.1.2, 4.2.1, 4.3.1, 4.3.2.	Lectures, E-learning, practical training and class activities, Virtual lab	Written, practical and oral exams
Week # 6	Microbiological assay of antibiotics, vitamins	1.1.3, 1.1.4, 1.1.5, 2.2.5, 3.2.1, 4.1.1, 4.1.2, 4.2.1, 4.3.1, 4.3.2	Lectures, E-learning, practical training and class activities, Virtual lab	Written, practical and oral exams

Week # 7	**periodical exam**			
Week # 8	Classification of non-antibiotic antimicrobial agents, mode of action & Resistance.	1.1.2, 1.1.4, 1.1.5, 2.2.5, 3.2.1, 4.1.1, 4.1.2, 4.2.1, 4.3.1, 4.3.2	Lectures, E-learning, practical training and class activities, Virtual lab	Written, practical and oral exams
Week # 9	Applications of non antibiotic antimicrobial agents &Evaluation.	1.1.2, 1.1.4, 1.1.5, 2.2.1, 2.2.5, 2.5.2, 3.1.1, 3.1.2, 3.2.1, 4.1.1, 4.1.2, 4.2.1, 4.3.1, 4.3.2	Lectures, E-learning, practical training and class activities, Virtual lab	Written, practical and oral exams
Week # 10	Microbial contamination of pharmaceutical products & problems	1.1.3, 1.1.4, 2.2.1, 2.2.2, 2.2.4, 2.3.1, 2.3.2, 2.3.3, 2.5.1, 2.5.3, 3.1.1, 3.1.2, 4.1.1, 4.1.2, 4.2.1, 4.3.1, 4.3.2	Lectures, E-learning, practical training and class activities, Virtual lab	Written, practical and oral exams
Week # 11	Microbial spoilage of pharmaceutical products	1.1.3, 1.1.4, 2.2.1, 2.2.2, 2.2.4, 2.3.1, 2.3.2, 2.3.3, 2.3.4, 2.5.1, 2.5.3, 3.1.1, 3.1.2, 4.1.1, 4.1.2, 4.2.1, 4.3.1, 4.3.2	Lectures, E-learning, practical training, seminars and class activities, Virtual lab	Written, practical and oral exams
Week # 12	Intoduction to Sterilization and Official methods of sterilization	1.1.3, 1.1.4, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.3.1, 2.3.2, 2.3.3, 2.5.1, 2.5.3, 3.1.1, 3.1.2, 4.1.1, 4.1.2, 4.2.1, 4.3.1, 4.3.2	Lectures, E-learning, seminars and practical training	Written, practical and oral exams

Week # 13	Validation of Sterilization process.	1.1.3, 1.1.4, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.3.1, 2.3.2, 2.3.3, 2.5.1, 2.5.3, 3.1.1, 3.1.2, 4.1.1, 4.1.2, 4.2.1, 4.3.1, 4.3.2	Lectures, E-learning, seminars and practical training	Written, practical and oral exams
Week # 14	Microbiological quality of pharmaceuticals	2.2.1, 2.2.2, 2.2.4, 2.3.1, 2.3.2, 2.3.3, 2.5.1, 2.5.3, 2.5.4, 3.1.1, 3.1.2, 4.2.1, 4.3.1, 4.3.2	Lectures and E-learning	Written and oral exams
Week # 15	Aseptic area and testing of pyrogins	2.2.1, 2.2.2, 2.2.4, 2.3.1, 2.3.2, 2.3.3, 2.5.1, 2.5.3, 2.5.4, 3.1.1, 3.1.2, 4.2.1, 4.3.1, 4.3.2	Lectures and E-learning	Written and oral exams

Name and Signature
Course Coordinator

Prof. Dr. Ramadan El-domany

Name and Signature
program Coordinator

Prof. Abdelaziz El-Ashmawy

Course Specification
(2025)

1. Basic Information

Course Title (according to the bylaw)	Phytochemistry I			
Course Code (according to the bylaw)	PG 504			
Department/s participating in delivery of the course	Pharmacognosy department			
Number of credit hours/points of the course (according to the bylaw)	Theoretical	Practical	Other (specify)	Total
	2	1		3
Course Type	compulsory			
Academic level at which the course is taught	Third level, semester 1			
Prerequisite	Registration			
Academic Program	Bachelor of Pharmacy (Pharm D)			
Faculty/Institute	Faculty of Pharmacy			
University/Academy	Kafrelsheikh University			
Name of Course Coordinator	Dr. Abdullah A. Elgazar Dr. Mai H. Elnaggar			
Course Specification Approval Date	9/2025			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ….)	Department council			

2. Course Overview (Brief summary of scientific content)

Based on complementary medicine and Egyptian medicinal plants that can be used as natural extracts, bioactive raw materials and phytochemical standards to serve the pharmaceuticals, cosmetics and food industries in Egypt. The course aims to provide students with the knowledge and skills that enable them to understand, describe and deal with the chemistry of volatile oils, resins, miscellaneous terpenoids, bitters of plant or animal origin, carbohydrates and glycosides of plant or animal origin and different techniques used for their preparation, identification and determination. Also, the students should become aware of different chromatographic methods used for isolation and analysis of different plant constituents and their pharmacological actions and medicinal uses.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
Domain 1 (FUNDAMENTAL KNOWLEDGE) **1-1- COMPETENCY**		**- Upon finishing this course, students will be able to integrate knowledge from Complementary medicine and Egyptian medicinal plants that can be used as natural extracts, bioactive raw materials, and phytochemical standards to serve the pharmaceuticals, cosmetics, and food industries in Egypt.** **This competency will be developed via the following key elements:**	
1.1.1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	1.1.1	Show understanding of classification of phytochemicals and nutraceuticals such as glycoside , volatile oil and carbohydrates in the context of functional group analysis and organic chemistry.
		1.1.2	Recognize Egyptian medicinal plants containing volatile oils, carbohydrates, glycosides, and bitters principals of plant or animals that can be used as natural extracts.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	Integrate knowledge from fundamental sciences to handle, identify, extract, design, prepare, analyze, and assure quality of synthetic/natural pharmaceutical materials/products.	**1.1.3**	Identify bioactive raw materials, and phytochemical standards to serve the pharmaceuticals, cosmetics, and food industries in Egypt.
1.1.3		**1.1.4**	Describe the chemistry of volatile oils, glycosides, and bitters principals of plant or animals.
		1.1.5	Discuss qualitative and quantitative analysis of medicinal plants, active constituents as well as the methods of handling, identification, isolation, and purification.
		1.1.6	Summarize the pharmaceutical uses of volatile oils, carbohydrates, glycosides, and bitters principals of plant or animals.
1.1.4	Articulate knowledge from fundamental sciences to explain drugs' actions and evaluate their appropriateness, effectiveness, and safety in individuals and populations.	**1.1.7**	Explain the basics of complementary medicine and relate the phytochemical profile of Egyptian medicinal plants to their therapeutic effects, safety, and potential pharmaceutical applications**.**
		1.1.8	Identify and describe the chemistry, pharmaceutical uses, and handling procedures of volatile oils, carbohydrates, glycosides, and bitters from plant or animal sources
		1.1.9	Infer appropriate qualitative and quantitative analytical methods for the identification, isolation, purification, and quantification of active constituents from medicinal plants
1.1.5	Retrieve information from fundamental sciences to solve therapeutic problems	**1.1.10**	Retrieve and interpret phytochemical and pharmacological data of medicinal plants to address therapeutic need
		1.1.11	Correlate the chemical composition of volatile oils, carbohydrates, glycosides, and bitters with their potential pharmacological effects and safety profile

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
		1.1.12	Apply knowledge of natural products' chemistry and analysis to propose suitable herbal interventions for specific therapeutic problem
1.1.6	Utilize scientific literature and collect and interpret information to enhance professional decisions.	**1.1.13**	Apply suitable methods for isolation of different classes of phytochemicals such volatile oils, carbohydrates, glycosides, and bitters principals of plant or animals.
		1.1.14	Carry out different methods of purification of different phytochemicals
		1.1.15	Prepare quantification of volatile oils, carbohydrates, glycosides, and bitters principals of plant or animal
1.1.7	Identify and critically analyze newly emerging issues influencing pharmaceutical industry and patient health care	**1.1.16**	Identify newly emerging trends and challenges in the natural products and herbal medicines sector affecting the pharmaceutical industry
		1.1.17	Analyze the scientific, regulatory, and safety aspects of recent developments in pharmacognosy and phytopharmaceutical product
		1.1.18	Evaluate the potential impact of new technologies in preparation and delivery of phytochemicals on patient health care and public safety
DOMAIN 2: PROFESSIONAL AND ETHICAL PRACTICE **2-2- COMPETENCY**		**Upon finishing this course, students will be able to standardize pharmaceutical materials, and participate in systems for dispensing, storage, and distribution of medicines.** **This competency will be developed via the following key elements:**	
2.2.1	Isolate, design, identify, synthesize, purify, analyze, and standardize synthetic/natural pharmaceutical materials.	**2.2.1**	Conduct isolation and identification of volatile oils, carbohydrates, glycosides, and bitters principals of plant or animals

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
		2.2.2	Carry out synthetic strategies for preparation of glycosides and its aglycone
		2.2.3	Apply different methods of purification of volatile oils and carbohydrates
2.2.2	Apply the basic requirements of quality management system in developing, manufacturing, analyzing, storing, and distributing pharmaceutical materials/ products considering various incompatibilities.	2.2.4	Address the quality parameters required for raw herbal materials and phytopharmaceutical compounds.
		2.2.5	Implement quality assurance procedures during extraction, processing, and packaging of herbal products.
2.2.3	Recognize the principles of various tools and instruments and select the proper techniques for synthesis and analysis of different materials and production of pharmaceuticals.	2.2.7	Identify the operating principles and appropriate applications of analytical tools used in the isolation and characterization of bioactive natural products.
		2.2.8	Select suitable purification techniques to obtain high-purity active constituents from crude natural sources.
		2.2.9	Recognize the quality and standardization of isolated phytochemicals using validated pharmacognostic and instrumental methods.
2.2.4	Adopt the principles of pharmaceutical calculations, biostatistical analysis, bioinformatics, pharmacokinetics, and biopharmaceutics and their applications in new drug delivery systems, dose modification, bioequivalence studies, and pharmacy practice	2.2.10	Apply pharmaceutical calculations and basic biostatistical methods to analyze data related to natural products research and quality control

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
2-3- COMPETENCY		**Upon finishing his course, students will be able to handle synthetic/natural pharmaceutical materials/products effectively and safely with respect to relevant laws and legislations.** **This competency will be developed via the following key elements:**	
2.3.1	Handle, identify, and dispose biologicals, synthetic/natural materials, biotechnology-based and radio-labeled products, and other materials/products used in pharmaceutical fields.	**2.3.1**	Demonstrate safe handling techniques for crude drugs, herbal extracts, and laboratory chemicals used in pharmacognosy.
		2.3.2	Identify hazards and risk factors associated with biological, natural, synthetic, and biotechnology-based materials.
		2.3.3	Apply proper disposal procedures for different pharmaceutical materials in compliance with institutional and environmental regulation
2.3.2	Recognize and adopt ethical, legal, and safety guidelines for handling and disposal of biologicals, and pharmaceutical materials/products.	**2.3.4**	Identify the physicochemical properties and hazard categories of volatile oils, carbohydrates, glycosides, and bitters from plant or animal sources.
		2.3.5	Manipulate chemical, pharmaceutical, and biological materials following ethical, legal, and safety protocols.
		2.3.6	Follow approved Material Safety Data Sheet (MSDS) guidelines for handling, storage, and disposal of pharmaceutical substance
2-5- Competency		**Upon finishing his course, students will be able to contribute to pharmaceutical research studies and clinical trials needed to authorize medicinal products.** **This competency will be developed via the following key elements**	
2-5-1 Fulfill the requirements of the regulatory framework to authorize a medicinal product		2.5.1	Apply compendial regulations in the documentation and approval process for phytopharmaceutical products

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
including quality, safety, and efficacy requirements.		2.5.2	Conduct qualitative and quantitative analytical methods for natural products in compliance with pharmacopoeial and regulatory standards.
		2.5.3	Evaluate the safety, quality, and efficacy profiles of herbal preparations according to national and international guidelines.
2-5-3 Contribute in planning and conducting research studies using appropriate methodologies.		2.5.4	Analyze and interpret research data to draw valid conclusions and propose recommendations for the natural products industry
		2.5.5	Retrieve relevant scientific information from databases and literature to support natural products research.
		2.5.6	Design and conduct experimental or clinical research studies in the field of pharmacognosy using appropriate methodologies.
Domain 3: Pharmaceutical Care **3-2- competency**		**Upon finishing his course, students will be able to provide counseling and education services to patients and communities about safe and rational use of complementary medicine.** **This competency will be developed via the following key elements**	
3-2-3 Provide evidence-based information about safe use of complementary medicine including phytotherapy, aromatherapy, and nutraceuticals.		**3.2.1**	**Evaluate** scientific evidence supporting the use of Carbohydrate, glycoside, Volatile oil based therapies to ensure safety and efficacy
		3.2.2	**Select** appropriate over-the-counter preparations containing phytochemicals under the study based on patient symptoms.
		3.2.3	**Counsel** patients and healthcare professionals on the safe and effective use of aromatherapy, and nutraceuticals.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
3-2-4	Provide information about toxic profiles of drugs and other xenobiotics including sources, identification, symptoms, and management control.	**3.2.4**	**Manage** and recommend appropriate control measures for toxicity symptoms resulting from exposure to phytochemical under investigations.
		3.2.5	**Apply** drug information data to predict the toxicity of natural products.
		3.2.6	**Identify** the source of toxicity and relate it to specific plant constituents or contaminants.
Domain 4: Personal Practice **4-2- Competency**		**Upon finishing this course, students will be able to Effectively communicate verbally, non-verbally and in writing with individuals and communities.** **This competency will be developed via the following key elements:**	
4.2.2	Use contemporary technologies and media to demonstrate effective presentation skills.	**4.2.1**	**Prepare** clear and well-structured presentations on pharmacognosy-related topics using recent digital tools
		4.2.2	Demonstrate effective verbal and visual communication skills when presenting scientific content.
		4.2.3	Utilize modern media platforms and presentation software to engage the audience and convey information accurately

4. Teaching and Learning Methods

1- Lectures

3- E-learning

4- Practical training/ laboratory

5- Brain storming

6- Case study

7- Discussion

8- Assignment

9- Presentation

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical /Clinical/ .....)	Self-learning (Tasks/ Assignments/ Projects/ ...)	Other (to be determined)
1	Volatile extraction	4	2	2		
2	Hydrocarbons	4	2	2		
3	Alcohols	4	2	2		
4	Phenols	4	2	2		
5	Esters	4	2	2		
6	Aldehydes & ketones	4	2	2		
7	**Periodical exam**					
8	N- and S- containing compounds	4	2	2		
9	Carbohydrates: Introduction, classification.	4	2	2		

10	Carbohydrates: Simple natural sugars of medicinal value	**4**	**2**	**2**		

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments/ Projects/ ...)	Other (to be determined)
11	Carbohydrates: Polysaccharides: starch, cellulose, agar etc.	**4**	**2**	**2**		
12	Bitter principles: phenolic, ether,sesquiterpene lactone, isoflavone, furanochromones and furanocoumarins	**4**	**2**	**2**		
13	Glycosides: Cardiac	**4**	**2**	**2**		
14	Glycosides: Anthraquinone, Flavonoid,	**2**	**2**	**Practical exam**		
15	Glycosides: saponin, cyanogeneticand thioglycosides.	**2**	**2**	**Practical exam**		

5. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Formative exam	**Week 6 and 14**	**--**	**--**
2	Periodical exam	**Week 7**	**15**	
3	Final Written Exam	**Week 16 &17**	**50**	
4	Final Practical/Clinical/… Exam	**Week 14 & 15**	**15**	
5	Final Oral Exam	**Week 16 &17**	**10**	
6	Assignments / Project /Portfolio/ Logbook	**All semester**	**10**	

6. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	- Ganora, L. (2021). *Herbal constituents: Foundations of phytochemistry* (2nd ed.). Herbalchem Press. - Rajendran, J. L., & Raman, D. (2022). *Experimental pharmacognosy-I: Pharmacognosy and phytochemistry*. Pharma Publications. - Egbuna, C., Ifemeje, J. C., & others. (2021). *Phytochemistry: Volume 3: Marine sources, industrial applications, and recent advances*. Springer.
	Other References	- E-Notes on phytochemistry prepared in the form of a book authorized by thedepartment staff. Lab Manual of phytochemistry prepared and distributed by the Department
	Electronic Sources (Links must be added)	websites https://apps.who.int/medicinedocs/en/m/abstract/Js14213e/ www.biomedcentral.com www.medscape.com http://www.sciencedirect.com/ http://www.ncbi.nlm.nih.gov/
	Learning Platforms (Links must be added)	https://lms3.kfs.edu.eg/pharm/login/index.php
	Other (to be mentioned)	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Laboratory facilities .
	Supplies	Hot plates, digital balances and other lab instruments
	Electronic Programs	----
	Skill Labs/ Simulators	----
	Virtual Labs	----
	Other (to be mentioned)	Data show, smart board, Unit for distance learning, Computers, Internet and Library.

Name and Signature **Course Coordinator**	**Name and Signature** **Program Coordinator**

Kafrelsheikh University

Faculty of Pharmacy

جامعة كفر الشيخ

كلية الصيدلة

Course Specification

(2025)

1. Basic Information

Course Title (according to the bylaw)	Pharmaceutics III			
Course Code (according to the bylaw)	PT 505			
Department/s participating in delivery of the course	Pharmaceutics and Pharmaceutical Technology			
Number of credit hours/points of the course (according to the bylaw)	Theoretical	Practical	Other (specify)	Total
	2	1	-------	3
Course Type	compulsory			
Academic level at which the course is taught	Third level, Semester (1)			
Academic Program	Bachelor of pharmacy (Pharm D)			
Faculty/Institute	Faculty of pharmacy			
University/Academy	kafrelsheikh university			
Name of Course Coordinator	Prof. Abdelaziz Elsayed Ass. Prof. Eman Mazyed			
Course Specification Approval Date	9/2025			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department council			

2. Course Overview (Brief summary of scientific content)

The course introduces the students to the kinetics of drug decomposition including rate and order of the reaction, determination of the half-life, expiry date and shelf-life by different methods, stability testing, and in-vitro possible drug/excipients interactions. It also describes the principles and techniques involved in the formulation, and manufacturing of solid dosage forms including powders, granules, tablets, capsules and suppositories.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
Domain 1 (FUNDAMENTAL KNOWLEDGE) 1-1- COMPETENCY		**Upon finishing this course, students will be able to integrate knowledge from basic pharmaceutical science to determine different types of tablets, capsules, granules and suppositories. The student will also be able to list different methods of preparation of capsules and tablet, suppositories and quality control tests of tablet, suppositories and capsules.** **This competency will be developed via the following key elements:**	
1.1.1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	**1.1.1**	Discuss different types of tablets, granules, capsules and suppositories.
		1.1.2	Recognize different Methods of preparation of tablet, suppositories and capsules.
		1.1.3	Describe Tablet coating – sugar, film, and functional coating.
		1.1.4	List processing problems in tablet manufacture
		1.1.5	Recognize General considerations in the design of hard capsules
		1.1.6	Classify different types of suppositories.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
		1.1.7	Recognize the kinetics of drug decomposition including rate and order of the reaction.
		1.1.8	Determine the half-life, expiry date and shelf-life by different methods.
1.1.3	Integrate knowledge from fundamental sciences to handle, identify, extract, design, prepare, analyze, and assure quality of synthetic/natural pharmaceutical materials/products.	**1.1.9**	Select suitable method of preparation of tablets, granules and capsules and identify challenges in their preparation.
		1.1.10	Review the role of formulation design and additives in modifying the elegancy and appearance of tablets and capsules.
		1.1.11	List quality control test of tablets and capsules.
		1.1.12	Discuss the factors affecting stability of capsules, suppositories and tablets.
DOMAIN 2: PROFESSIONAL AND ETHICAL PRACTICE 2-2- COMPETENCY		**Upon finishing this course, students will be able to calculate powder flow by measuring angle of repose, carr index and hausner ratio. The student will be also able to formulate and manufacture different tablets, suppositories and granules and participate in systems for dispensing, storage, and distribution of them.** **This competency will be developed via the following key elements:**	
2.2.1	Isolate, design, identify, synthesize, purify, analyze, and standardize synthetic/natural pharmaceutical materials.	**2.2.1**	Formulate and prepare tablets, capsules, and suppositories according to good pharmaceutical practices.
		2.2.2	Perform standard quality control tests (e.g., weight variation, hardness, disintegration, dissolution, uniformity) to ensure product safety and efficacy.
		2.2.3	Design and adjust formulations considering patient needs and therapeutic requirements
2.2.2	Apply the basic requirements of quality management system in	**2.2.4**	Apply the rules of manufacturing, storage and transportation of tablet, suppositories, granules and capsules.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	developing, manufacturing, analyzing, storing, and distributing pharmaceutical materials/products considering various incompatibilities.	**2.2.5**	Understand General considerations in the design of hard capsules.
		2.2.6	Select the best additives for solving tablet problem.
		2.2.7	Recognize factors affecting flow of solid dosage form and incompatibility problems.
		2.2.8	Demonstrate commitment to professional ethics and safety measures during pharmaceutical preparation.
2.2.3	Recognize the principles of various tools and instruments and select the proper techniques for synthesis and analysis of different materials and production of pharmaceuticals.	**2.2.9**	Recognize different instrument for preparation of tablet, capsules and suppositories.
		2.2.10	Select suitable machine for tablet and capsule coating.
		2.2.11	Assess the quality of tablet, capsules and suppositories.
2.2.4	Adopt the principles of pharmaceutical calculations, biostatistical analysis, bioinformatics, pharmacokinetics, and biopharmaceutics and their applications in new drug delivery systems, dose modification, bioequivalence studies, and pharmacy practice.	**2.2.12**	Recognize principles of pharmaceutical calculation for preparation of tablet and determination of powder flow.
		2.2.13	Recognize recent knowledge in pharmaceutical technology to design tablets, capsules and suppositories.
2-3- COMPETENCY		**Upon finishing this course, students will be able to handle and dispose synthetic/natural pharmaceutical materials used in measuring powder flow and preparation of**	

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
		tablets, suppositories and granules effectively and safely with respect to relevant laws and legislations. **This competency will be developed via the following key elements:**	
2.3.1	Handle, identify, and dispose biologicals, synthetic/natural materials, biotechnology-based and radio-labeled products, and other materials/products used in pharmaceutical fields.	**2.3.1**	Safely handle different chemicals used in preparation of tablets, capsules, granules and suppositories to avoid harm to the students.
2.3.2	Recognize and adopt ethical, legal, and safety guidelines for handling and disposal of biological, and pharmaceutical materials/products.	**2.3.2**	Recognize and adopt MSDS safety guidelines for safe and appropriate handling and disposal of pharmaceutical chemical materials.
		2.3.3	Demonstrate the safe use and storage of tablets, suppositories and capsules to the patient.
Domain 4: Personal Practice **4-2- Competency**		**Upon finishing this course, students will be able to Effectively communicate verbally, non-verbally and in writing with individuals and communities.** **This competency will be developed via the following key elements:**	
4.2.2	Use contemporary technologies and media to demonstrate effective presentation skills.	**4.2.1**	Perform presentation on the tablets, granules, capsules and suppositories and their benefits.
		4.2.2	Evaluate and apply effective presentation skills through modern technologies and digital media to deliver impactful and engaging experiences. This involves utilizing interactive slides, integrating multimedia elements such as videos, images, and audio,

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
			and adopting real-time feedback and collaboration tools.

4. Teaching and Learning Methods

1- Lectures (√)

2- E-learning (√)

3- Practical training/ laboratory (√)

4- Discussion, Brain storming (√)

5- Seminars (√)

6- Assignment (√)

7- Case study (√)

Course Schedule						
Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/ discussion groups/ .....)	**Training (Practical/ Clinical/ .....)**	**Self-learning (Tasks/ Assignments / Projects/ ...)**	**Other (to be determined)**
1	Introduction Tablets Types of tablets	**4**	**2**	**2**	**----------**	**----------**
2	Tablet additives	**4**	**2**	**2**	**----------**	**----------**
3	Methods of tablet manufacture	**4**	**2**	**2**	**----------**	**----------**
4	Methods of tablet manufacture (cont.)	**4**	**2**	**2**	**----------**	**----------**
5	Processing problems in tablet manufacture	**4**	**2**	**2**	**----------**	**----------**
6	Tablet evaluation	**4**	**2**	**2**	**----------**	**----------**
7	**Periodical exam**					
8	Tablet coating – sugar, film, and functional coating	**4**	**2**	**2**	**----------**	**----------**
9	Introduction – granuleation: Types of granules	**4**	**2**	**2**	**----------**	**----------**
10	suppositories: Types and methodsof preperation of **suppositories.**	**4**	**2**	**2**	**----------**	**----------**
11	Introduction to capsules	**4**	**2**	**2**	**----------**	**----------**
12	General considerations in the design of hard capsules.	**4**	**2**	**2**	**----------**	**----------**

13	General considerations in the design of hard capsules and microencapsulation.	**4**	**2**	**2**	----------	----------
14	Storage and packing of capsules Quality control tests for capsules	**4**	**2**	Practical exam	----------	----------
15	kinetics of drug decomposition include rate and order of the reaction.	**4**	**2**	Practical exam	----------	----------

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Formative exam	3	Training	----
2	Periodical exam	7	15	15%
3	Final Practical/Clinical/… Exam	14,15	15	15%
4	Final written exam	16,17	50	50%
5	Final Oral Exam	16,17	10	10%
6	Assignments / Project /Portfolio/ Logbook	11,12	10	10%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	- Michael E. Aulton, Aulton's Pharmaceutics: The Design and Manufacture of Medicines, Kevin Taylor, Fifth Edition, 2007. - Tovey GD, editor. Specialised pharmaceutical formulation: the science and technology of dosage forms. Cambridge: Royal Society of Chemistry; 2022. - Nayak AK, Sen KK, editors. Dosage forms, formulation developments and regulations: recent and future trends in pharmaceutics. Volume 1. Singapore: Springer; 2023.
	Other References	Notes and Lab manual prepared by the department staff.

	Electronic Sources (Links must be added)	www.pubmed.com www.sciencedirect.com
	Learning Platforms (Links must be added)	**https://lms3.kfs.edu.eg/pharm/login/index.php**
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Laboratory facilities (Equipment of factory).
	Supplies	Water bath, digital balances and other lab instruments
	Electronic Programs	----
	Skill Labs/ Simulators	----
	Virtual Labs	----
	Other (to be mentioned)	Data show, smart boards, Unit for distance learning, Computers, Internet and Library.

Course Plan

Matrix of course learning outcomes CLOs – Teaching and Learning Strategy and Student Assessment

Course title: Pharmaceutics III **Course code: PT 505**

Course Contents		Key elements	Teaching and Learning Methods	Student Assessment Methods
Week # 1	Introduction – Tablets: Types of tablets	1.1.1, 1.1.7, 2.2.1, 2.2.2, 2.2.5, 2.2.6, 2.2.9, 2.2.10, 2.3.2, 4.2.1	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 2	Tablet additives	1.1.8, 2.2.4, 2.3.1, 4.2.2.	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 3	Methods of tablet manufacture	1.1.2, 1.1.7,1.1.8, 2.2.1, 2.2.2, 2.2.5, 2.2.6, 2.2.9, 2.2.10, 2.3.1, 4.2.1.	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 4	Methods of tablet manufacture (cont.)	1.1.2, 1.1.7,1.1.8, 2.2.1, 2.2.2, 2.2.5, 2.2.6, 2.2.9, 2.2.10, 2.3.1, 4.2.1.	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 5	Processing problems in tablet manufacture	1.1.4, 1.1.6, 1.1.9, 2.2.11, 2.2.13, 2.3.2, 4.2.2.	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 6	Tablet evaluation	1.1.10, 1.1.11, 2.2.7, 2.2.8, 2.2.10, 2.2.11, 2.3.2,2.3.3, 4.2.1.	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 7	**Periodical exam**			
Week # 8	Tablet coating – sugar, film, and functional coating	1.1.10.1.1.11, 1.1.12, 1.1.13, 2.2.6, 2.2.7, 2.2.9.	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 9	Introduction – granuleation: Types of granules	1.1.1,1.1.7, 2.2.1, 2.2.2, 2.3.2,2.3.3, 4.2.1,4.2.2	Lectures, E-learning, practical training and class activities	Written, practical and oral exams

Week # 10	suppositories: Types and methodsof preperation of **suppositories.**	1.1.1, 1.1.2, 1.1,6, 1.1.10, 1.1.12, 2.2.1, 2.2.2, 2.2.8, 2.2.10, 2.3.3, 4.2.1, 4.2.2.	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 11	Introduction to capsules	1.1.1, 1.1.2, 1.1.7, 2.2.6, 2.2.7, 2.2.8. 2.2.11.	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 12	Introduction to capsules	1.1.7, 2.2.6, 2.2.7, 2.2.10, 4.2.1.	Lectures, E-learning, practical training, seminars and class activities	Written, practical and oral exams
Week # 13	General considerations in the design of hard capsules.	1.1.5, 1.1.8, 1.1.13, 2.2.3, 2.2.6, 2.2.7, 2.2.8. 2.2.11, 2.2.12.	Lectures, E-learning, seminars and practical training	Written, practical and oral exams
Week # 14	Storage and packing of capsules Quality control tests for capsules	2.2.1, 2.2.3, 2.2.8, 2.2.11.2.2.13, 2.3.2,2.3.3, 4.2.2	Lectures and E-learning	Written, practical and oral exams
Week # 15	kinetics of drug decomposition including rate and order of the reaction.	1.1.9, 1.1.10 2.3.2, 2.3.3, 2.2.8, 2.2.11.2.2.13.	Lectures and E-learning	Written and oral exams

Name and Signature
Course Coordinator
Prof. Abdelaziz Elsayed
Ass. Prof. Eman Mazyed

Name and Signature
Program Coordinator
Prof. Abdelaziz Elsayed

Kafrelsheikh University
Faculty of Pharmacy

جامعة كفر الشيخ
كلية الصيدلة

Course Specification
(2025)

1. Basic Information

Course Title (according to the bylaw)	Medicinal Chemistry I			
Course Code (according to the bylaw)	PC 504			
Department/s participating in delivery of the course	Pharmaceutical Chemistry Department			
Number of credit hours/points of the course (according to the bylaw)	Theoretical	Practical	Other (specify)	Total
	2	1	--------	3
Course Type	Compulsory			
Academic level at which the course is taught	Third level, Semester (1)			
Academic Program	Bachelor of Pharmacy (Pharm-D)			
Faculty/Institute	Faculty of Pharmacy			
University/Academy	Kafrelsheikh University			
Name of Course Coordinator	Associate. Prof. Rofida Salem			
Course Specification Approval Date	9/2025			
Course Specification Approval	Department Counsil			

2. Course Overview (Brief summary of scientific content)

This course covers an introduction to medicinal chemistry, the effect of physicochemical properities on pharmacokinetics and pharmacodynamics of drugs: cardiovascular agents, steroids, thyroid hormones, antihistamines, proton pump inhibitors and GIT drugs, SAR (Structure-activity relationship) of different classes of drugs and pharmacopeial methods of assay for drugs in different dosage forms.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
Domain 1 (Fundamental Knowledge) **1.1-COMPETENCY**		**Upon completing this course, students will be able to integrate knowledge from basic and applied pharmaceutical and clinical sciences to standardize materials, formulate and manufacture products, and deliver population and patient-centered care.** **This competency will be developed via the following key elements:**	
1.1.1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	**1.1.1**	Describe the fundamental principles of medicinal chemistry including drug structure, physicochemical properties, and biological activity.
		1.1.2	Recognize the role of functional groups in determining drug activity and therapeutic profile.
		1.1.3	Explain how chemical properties of drugs affect pharmacological action and clinical use.
1.1.3	Integrate knowledge from fundamental sciences to handle, identify, extract, design, prepare, analyze, and assure quality of	**1.1.4**	Discuss the extraction and identification of natural compounds with medicinal importance.
		1.1.5	Correlate structural modifications with activity changes in drug classes (SAR).

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	synthetic/natural pharmaceutical materials/products.	**1.1.6**	Apply chemical knowledge to ensure identity, purity, and quality of medicinal agents.
1.1.4	Articulate knowledge from fundamental sciences to explain drugs' actions and evaluate their appropriateness, effectiveness, and safety in individuals and population.	**1.1.7**	Explain drug–target interactions (enzymes, receptors, nucleic acids) at the molecular level.
		1.1.8	Relate structural features of drugs to their mechanisms of action and therapeutic applications.
		1.1.9	Predict adverse effects and drug interactions based on chemical and metabolic pathways.
1.1.6	Utilize scientific literature and collect and interpret information to enhance professional decisions.	**1.1.10**	Search and retrieve relevant medicinal chemistry information from scientific journals and databases.
		1.1.11	Critically evaluate published literature on drug structures, actions, and modifications.
DOMAIN 2: PROFESSIONAL AND ETHICAL PRACTICE 2-2- COMPETENCY		**Upon completing this course, students will be able to standardize pharmaceutical materials, formulate and manufacture pharmaceutical products, and participate in systems for dispensing, storage, and distribution of medicines.** **This competency will be developed via the following key elements:**	
2.2.1	Isolate, design, identify, synthesize, purify, analyze, and standardize synthetic/natural pharmaceutical materials.	**2.2.1**	Identify drugs of synthetic and natural origin and describe their preparation pathways.
		2.2.2	Interpret analytical data (IR, NMR, UV, MS) used in the identification of pharmaceuticals.
		2.2.3	Discuss methods for isolation and purification of bioactive natural compounds.
2.2.2	Apply the basic requirements of quality management system in developing, manufacturing, analyzing, storing, and distributing pharmaceutical materials/	**2.2.4**	Apply quality control principles to ensure drug purity and therapeutic efficiency.
		2.2.5	Discuss chemical stability testing of pharmaceuticals during storage and handling.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	products considering various incompatibilities.		
2.2.3	Recognize the principles of various tools and instruments and select the proper techniques for synthesis and analysis of different materials and production of pharmaceuticals.	**2.2.6**	Recognize the role of spectroscopic and chromatographic techniques in medicinal chemistry.
		2.2.7	Select appropriate analytical methods for the qualitative and quantitative assessment of drugs.
		2.2.8	Explain the application of instrumental techniques in purity testing and SAR studies.
2.2.4	Adopt the principles of pharmaceutical calculations, biostatistical analysis, bioinformatics, pharmacokinetics, and biopharmaceutics and their applications in new drug delivery systems, dose modification, bioequivalence studies, and pharmacy practice.	**2.2.9**	Apply basic pharmaceutical calculations related to drug design and molecular modification.
		2.2.10	Relate drug physicochemical properties (pKa, solubility, partition coefficient) to absorption and distribution.
		2.2.11	Discuss the influence of chemical modifications on bioavailability and pharmacokinetics.
2-3- COMPETENCY		**Upon completing this course, students will be able to handle and dispose of biological and synthetic/natural pharmaceutical materials/products effectively and safely with respect to relevant laws and legislations.** **This competency will be developed via the following key elements:**	
2.3.1	Handle, identify, and dispose biologicals, synthetic/natural materials, biotechnology-based and radio-labeled products, and other materials/products used in pharmaceutical field.	**2.3.1**	Apply correct storage and labeling procedures for pharmaceutical chemicals.
		2.3.2	Follow proper protocols for disposal of chemical and biological wastes.
2-4- COMPETENCY		**Upon completing this course, students will be able to actively share professional decisions and proper actions**	

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
		to save patient's life in emergency situations including poisoning with various xenobiotics and effectively work in forensic fields. **This competency will be developed via the following key elements:**	
2.4.2	Demonstrate understanding of the first aid measures needed to save patient's life.	**2.4.1**	Recognize poisoning symptoms caused by exposure to medicinal or chemical substances.
		2.4.2	Describe first aid management for drug overdoses and accidental toxic exposures.
		2.4.3	Apply knowledge of antidotes and emergency treatments in cases of drug toxicity.
		2.4.4	Demonstrate awareness of safety measures during laboratory and clinical exposure.
2-5- COMPETENCY		**Upon completing this course, students will be able to contribute to pharmaceutical research studies and clinical trials needed to authorize medicinal products.** **This competency will be developed via the following key elements:**	
2.5.1	Fulfill the requirements of the regulatory framework to authorize a medicinal product including quality, safety, and efficacy requirements.	**2.5.1**	Explain the chemical quality attributes required for drug approval.
		2.5.2	Relate structural features to regulatory requirements of safety and efficacy.
		2.5.3	Identify documentation required for chemical quality control in drug registration.
2.5.3	Contribute in planning and conducting research studies using appropriate methodologies.	**2.5.4**	Formulate medicinal chemistry research questions related to drug structure and activity.
		2.5.5	Apply basic research methodologies in SAR, QSAR, and drug design.
		2.5.6	Collect and interpret experimental data to support research conclusions.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
DOMAIN 3: Pharmaceutical Care 3-2- COMPETENCY		**Upon completing this course, students will be able to provide counselling and education services to patients and communities about safe and rational use of medicines and medical devices. This competency will be developed via the following key elements:**	
3.2.1	Integrate the pharmacological properties of drugs including mechanisms of action, therapeutic uses, dosage, contra-indications, adverse drug reactions and drug interactions	**3.2.1**	Correlate therapeutic use with drug chemical classification and structural features.
		3.2.2	Predict possible contraindications and drug–drug interactions based on structural similarities.
DOMAIN 4: Personal Practice 4-2- COMPETENCY		**Upon completing this course, students will be able effectively communicate verbally, non-verbally and in writing with individuals and communities. This competency will be developed via the following key elements:**	
4.2.2	Use contemporary technologies and media to demonstrate effective presentation skills.	**4.2.1**	Use chemical drawing and molecular visualization software to present drug structures.
		4.2.2	Prepare PowerPoint presentations summarizing SAR and drug action.
		4.2.3	Design posters and infographics illustrating chemical and pharmacological properties of drugs.
		4.2.4	Deliver oral presentations integrating medicinal chemistry knowledge with clinical applications.

4. Teaching and Learning Methods

.1- Lectures (√)

2- E-learning (√)

3- Practical training/ laboratory (√)

4- Discussion (√)

5- Brainstorming (√)

6- Assignments (√)

7- Case study (√)

8- Seminars (√)

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/ discussion groups/ .....)	Training (Practical/ Clinical/ .....)	Self-learning (Tasks/ Assignments/ Projects/ ...)	Other (to be determined)
1	Introduction to Medicinal Chemistry	**4**	**2**	**2**	**---**	**---**
2	H1 Antihistamines	**4**	**2**	**2**	**---**	**---**
3	H1 Antihistamines (cont.)	**4**	**2**	**2**	**---**	**---**
4	H2-Antihistamines and Proton Pump Inhibitors	**4**	**2**	**2**	**---**	**---**
5	Steroid hormones	**4**	**2**	**2**	**---**	**---**
6	Steroid hormones (cont.) & Thyroid Hormones	**4**	**2**	**2**	**---**	**---**
7	**Semester works**					
8	Adrenergic drugs	**4**	**2**	**2**	**---**	**---**
9	Cholinergic drugs	**4**	**2**	**2**	**---**	**---**
10	GIT drugs	**4**	**2**	**2**	**---**	**---**
11	Drugs acting on Cardiovascular system	**4**	**2**	**2**	**---**	**---**
12	Drugs acting on Cardiovascular system	**4**	**2**	**2**	**---**	**---**
13	Drugs acting on Cardiovascular system	**4**	**2**	**2**	**---**	**---**
14	Drugs acting on Cardiovascular system	**2**	**2**	**Practical exam**		
15	Revision	**2**	**2**	**Practical exam**		

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodical exam	Week 7	15 marks	15%
2	Final Practical/Clinical/… Exam	Week 14,15	20 marks	20%
3	Final Written Exam	Week 16,17	50 marks	50%
4	Final Oral Exam	Week 16,17	10 marks	10%
5	Assignments / Project /Portfolio/ Logbook	All semester long	5 marks	5%
	Total		100	100%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Notes on Medicinal chemistry prepared by Dept. of Pharmaceutical Chemistry. Lab Manual of Medicinal Chemistry prepared by Dept. of Pharmaceutical Chemistry.
	Other References	Wilson and Gisvold's " Textbook of Organic and Pharmaceutical Chemistry", 12th Ed., Jaime N. Delgado, J.B. Lippincot Co., 2011. William O Foye, " Principle of Medicinal Chemistry" 8th edition (2019), Williams & Wilkins, London
	Electronic Sources	https://www.ekb.eg/ar/home http://www.sciencedirect.com/ https://pubmed.ncbi.nlm.nih.gov/
	Learning Platforms	https://lms3.kfs.edu.eg/pharm/login/index.php
	Other	
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show, Computers, Library, Internet.
	Supplies	Classrooms.

Course Plan

Matrix of course learning outcomes CLOs – Teaching and Learning Strategy and Student Assessment

Course title: Medicinal Chemistry I **Course code: PC 504**

Course Contents		Key elements	Teaching and Learning Methods	Student Assessment Methods
Week # 1	**Introduction to Medicinal Chemistry**	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9, 1.1.10, 1.1.11, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10, 2.2.11, 2.3.1, 2.3.2, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 3.2.1, 3.2.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4.	Lectures, E-learning practical training and class activities	Written, practical and oral exams
Week # 2	**H1 Antihistamines**	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9, 1.1.10, 1.1.11, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10, 2.2.11, 2.3.1, 2.3.2, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 3.2.1, 3.2.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4.	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 3	**H1 Antihistamines (cont.)**	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9, 1.1.10, 1.1.11, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10, 2.2.11, 2.3.1, 2.3.2, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 3.2.1, 3.2.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4.	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 4	**H2-Antihistamines and Proton Pump Inhibitors**	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9, 1.1.10, 1.1.11, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10, 2.2.11, 2.3.1, 2.3.2, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 3.2.1, 3.2.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4.	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 5	**Steroid hormones**	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9, 1.1.10, 1.1.11, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10, 2.2.11, 2.3.1, 2.3.2, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 3.2.1, 3.2.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4.	Lectures, E-learning, practical training and class activities	Written, practical and oral exams

Week # 6	**Steroid hormones (cont.) & Thyroid Hormones**	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9, 1.1.10, 1.1.11, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10, 2.2.11, 2.3.1, 2.3.2, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 3.2.1, 3.2.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4.	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 7	**Semester works**			
Week # 8	**Hypoglycemic drugs**	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9, 1.1.10, 1.1.11, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10, 2.2.11, 2.3.1, 2.3.2, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 3.2.1, 3.2.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4.	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 9	**Adrenergic drugs**	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9, 1.1.10, 1.1.11, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10, 2.2.11, 2.3.1, 2.3.2, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 3.2.1, 3.2.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4.	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 10	**Cholinergic drugs**	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9, 1.1.10, 1.1.11, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10, 2.2.11, 2.3.1, 2.3.2, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 3.2.1, 3.2.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4.	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 11	**GIT drugs**	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9, 1.1.10, 1.1.11, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10, 2.2.11, 2.3.1, 2.3.2, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 3.2.1, 3.2.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4.	Lectures, E-learning, practical training, seminars and class activities	Written, practical and oral exams
Week # 12	**Drugs acting on Cardiovascular system**	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9, 1.1.10, 1.1.11, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10, 2.2.11, 2.3.1, 2.3.2, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 3.2.1, 3.2.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4.	Lectures, E-learning, seminars and practical training	Written, practical and oral exams

Week # 13	**Drugs acting on Cardiovascular system**	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9, 1.1.10, 1.1.11, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10, 2.2.11, 2.3.1, 2.3.2, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 3.2.1, 3.2.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4.	Lectures and E-learning	Written, practical and oral exams
Week # 14	**Drugs acting on Cardiovascular system**	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9, 1.1.10, 1.1.11, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10, 2.2.11, 2.3.1, 2.3.2, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 3.2.1, 3.2.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4.	Lectures and E-learning	Written and oral exams
Week # 15	**Drugs acting on Cardiovascular system**	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9, 1.1.10, 1.1.11, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10, 2.2.11, 2.3.1, 2.3.2, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 3.2.1, 3.2.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4.	Lectures and E-learning	Written and oral exams

Name and Signature
Course Coordinator

Associate. Prof. Rofida Salem

Name and Signature
Program Coordinator

Prof. Abdelaziz Elsayed

Kafrelsheikh University

Faculty of Pharmacy

جامعة كفر الشيخ

كلية الصيدلة

Course Specification

(2025)

1. Basic Information

Course Title (according to the bylaw)	Pharmacology 1			
Course Code (according to the bylaw)	PO502			
Department/s participating in delivery of the course	Pharmacology and Toxicology department			
Number of credit hours/points of the course (according to the bylaw)	Theoretical	Practical	Other (specify)	Total
	2	1	----	3
Course Type	Compulsory			
Academic level at which the course is taught	Third level, semester 1			
Academic Program	Bachelor of Pharmacy (Pharm D.)			
Faculty/Institute	Faculty of Pharmacy,			
University/Academy	Kafrelsheikh University.			
Name of Course Coordinator	Prof. Dr. Sherin zakaria			
Course Specification Approval Date	9/2025			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department council			

2. Course Overview (Brief summary of scientific content)

This course covers general information about pharmacology including the pharmacokinetics and pharmacodynamics of drugs, Understands the mechanism of action of different drugs affecting the autonomic nervous system, cardiovascular system and renal system(diuretics), Assess the use and the side effects of such drugs. And also, practically screen drugs affecting the autonomic nervous system in laboratory animals.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
Domain 1 (FUNDAMENTAL KNOWLEDGE) 1-1- COMPETENCY		**Upon finishing this course, students will be able to integrate knowledge from basic information about pharmacology, Different categories of autonomic nervous system and cardiovascular system.** **This competency will be developed via the following key elements:**	
1.1.1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	1.1.1	Identify general principles of Pharmacology such as pharmacokinetics, pharmacodynamics, receptor theory, drug interaction and principals of therapeutics.
		1.1.2	Describe how these principles explain the processes of drug absorption, distribution, metabolism, and excretion, as well as their

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
			mechanisms of action.
		1.1.3	List the different categories of parasympathetic- and sympathetic-acting drugs
1.1.4	Articulate knowledge from fundamental sciences to explain drugs' actions and evaluate their appropriateness, effectiveness, and safety in individuals and populations.	1.1.4	Discuss the physiological responses produced by parasympathetic- and sympathetic-acting drugs and their therapeutic uses.
		1.1.5	Retrieve information about hypertension and drug therapy and the mechanism of action of drugs and Recognize differences between different types of diuretics
		1.1.6	Outline the different types of cardiac diseases, such as arrhythmia and congestive heart failure, along with the corresponding drug therapies.
1.1.5	Retrieve information from fundamental sciences to solve therapeutic problems.	1.1.7	State the main drug classes used in treating hypertension, integrating scientific knowledge to ensure effective patient care.
		1.1.8	Outline cardiac diseases and retrieve scientific information to select appropriate drug therapies.
DOMAIN 2: PROFESSIONAL AND ETHICAL PRACTICE **2-1- COMPETENCY**		**Upon finishing this course, students will be able to Work collaboratively as a member of an inter-professional health care team to improve the quality of life of individuals and communities, and respect patients' rights.**	

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
		This competency will be developed via the following key elements:	
2.1.2	Adopt ethics of health care and pharmacy profession respecting patients' rights and valuing people diversity.	**2.1.1**	Handle safely synthetic materials and experimental animals to avoid their harm to individuals.
		2.1.2	Apply pharmacological knowledge to set appropriate therapeutic intervention and avoid side effect harming the patients.
2-2- COMPETENCY		**Upon finishing this course, students will be able to Standardize pharmaceutical materials, formulate and manufacture pharmaceutical products, and participate in systems for dispensing, storage, and distribution of medicines.** **This competency will be developed via the following key elements:**	
2.2.4	Adopt the principles of pharmaceutical calculations, biostatistical analysis, bioinformatics, pharmacokinetics, and bio-pharmaceutics and their applications in new drug delivery systems, dose modification, bioequivalence studies, and pharmacy practice.	**2.2.1**	Demonstrate practical skills in screening drugs affecting the autonomic nervous system using laboratory animal experiments, and **use** scientific data to support safe and effective pharmacy practice.
2-3- COMPETENCY		**Upon finishing this course, students will be able to Handle and dispose biologicals and synthetic/natural pharmaceutical materials/products effectively and safely with respect to relevant laws and legislations.** **This competency will be developed via the following key elements:**	
2.3.1	Handle, identify, and dispose biologicals, synthetic/natural	**2.3.1**	Handle safely synthetic materials and experimental animals to avoid their harm

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	materials, biotechnology-based and radio-labeled products, and other materials/products used in pharmaceutical fields.		to individuals.
2.3.2	Recognize and adopt ethical, legal, and safety guidelines for handling and disposal of biologicals, and pharmaceutical materials/products.	2.3.2	Recognize and adopt safety guidelines for safe and appropriate handling of animals, their disposal and disposal of the used drugs.
		2.3.3	Provide the in vitro experiments on isolated organs from laboratory animals.
		2.3.4	Apply the dose-response relationship of the different drug preparations.
2-4- COMPETENCY		**Upon finishing this course, students will be able to aactively share professional decisions and proper actions to save patient's life in emergency situations including poisoning with various xenobiotics, and effectively work in forensic fields.** **This competency will be developed via the following key elements:**	
2.4.4	Assess toxicity profiles of different xenobiotics and detect poisons in biological specimens.	2.4.1	**I**dentify toxic effect and mechanisms of drug-induced toxicity for agents affecting different body systems.
		2.4.2	Apply experimental pharmacology techniques to measure dose–response relationships and detect toxic effects of autonomic drugs in living organisms.
Domain 3: Pharmaceutical Care **3-2- Competency**		**Upon finishing this course, students will be able to pprovide counselling and education services to patients and communities about safe and rational use of medicines and medical devices.** **This competency will be developed via the following key elements:**	
3.2.1	Integrate the pharmacological properties of drugs including mechanisms of action, therapeutic uses, dosage, contra-indications,	3.2.1	Monitor the pharmacological effects of different autonomic drugs in in vivo experiments

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	adverse drug reactions and drug interactions.	3.2.2	Integrate knowledge to select suitable cardiovascular drugs according to patients criteria
3.2.2	Apply the principles of clinical pharmacology and pharmacovigilance for the rational use of medicines and medical devices.	3.2.3	Provide suitable pharmaceutical care plan to patients base on their pharmacological knowledge.
Domain 4: Personal Practice **4-2- Competency**		**Upon finishing this course, students will be able to Effectively communicate verbally, non-verbally and in writing with individuals and communities.** **This competency will be developed via the following key elements:**	
4.2.2	Use contemporary technologies and media to demonstrate effective presentation skills.	4.2.1	Apply skills of the ability to interact effectively with patients, the public and health care professionals; including communication, both written and oral.
		4.2.2	Demonstrate effective communication by verbal means and appreciate the joint effort in teamwork
		4.2.3	Analyze data critically and information from different sources.
		4.2.4	Demonstrate critical-thinking abilities.

4. Teaching and Learning Methods

1- Lectures
2- E-learning
3- Practical training/ laboratory
4- Case study
5- Brain storming
6- Assignment
7- Discussion
8- Seminars

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	**Training** (Practical/Clinical/ .....)	**Self-learning** (Tasks/ Assignments/ Projects/ ...)	**Other** (to be determined)
1	Introduction to general principles of Pharmacology	**4**	**2**	**2**		
2	Introduction to general principles of Pharmacology (cont.)	**4**	**2**	**2**		
3	Pharmacological actions of drugs acting on autonomic nervous system(cont.)	**4**	**2**	**2**		
4	Pharmacological actions of drugs acting on autonomic nervous system (cont.)	**4**	**2**	**2**		
5	Pharmacological actions of drugs acting on autonomic nervous system (cont.)	**4**	**2**	**2**		
6	Pharmacological actions of drugs acting on autonomic nervous system (cont.)	**4**	**2**	**2**		
7	**Semester work**					
8	Pharmacological actions of drugs acting on cardiovascular system	**4**	**2**	**2**		
9	Pharmacological actions of drugs acting on cardiovascular system (cont.)	**4**	**2**	**2**		
10	Pharmacological actions of drugs acting on cardiovascular system(cont.)	**4**	**2**	**2**		
11	Pharmacological actions of drugs acting on cardiovascular system (cont.)	**4**	**2**	**2**		

12	Pharmacological actions of drugs acting on cardiovascular system (cont.)	**4**	**2**	**2**		
13	Pharmacological actions of drugs acting on cardiovascular system (cont.)	**4**	**2**	**2**		
14	Pharmacological actions of drugs acting on cardiovascular system (cont.)	**2**	**2**	**Practical exam**		
15	Revision	**2**	**2**	**Practical exam**		

5. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks (%)
1	Exam 1written (formative exam)	4th week	5	5
2	Periodical exam	7th week	10	10
	Final Practical/Clinical/… Exam	14th ,15th	25	25
3	Final Written Exam	16th ,17th	50	50
	Final Oral Exam	16th ,17th	10	10

6. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	The Pharmacological Basis of Therapeutics (2008). Goodman & Gilman's. 12 th editions. The McGraw-Hill Companies
	Other References	-Basic & Clinical Pharmacology (2021`). BG. Katzung.15 th ed. McGraw-Hill . -Pharmacology (2007). Rang H.P.& Dale M. 7th Edition. Churchill Livingston London -Lippincott Modern Pharmacology (2019). C. Champe, A. Harvey and Denise R. (illustrated pharmacology

		Review). South Asian Edition. Lippincott Williams & Wilkins
	Electronic Sources (Links must be added)	www.biomedcentral.com -www.Pubmed.com -www.medscape.com
	Learning Platforms (Links must be added)	**https://lms3.kfs.edu.eg/pharm/login/index.php**
	Other (to be mentioned)	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	-Data show -Computers . - Internet
	Supplies	**Laboratory facilities**: laboratory animals, chemicals, drugs, animal cages, digital balances and funnels. - Lab notebooks.
	Electronic Programs	**----**
	Skill Labs/ Simulators	**----**
	Virtual Labs	**----**
	Other (to be mentioned)	Data show, smart board, Unit for distance learning, Computers, Internet and Library.

Course Plan

Matrix of course learning outcomes CLOs – Teaching and Learning Strategy and Student Assessment

Course title: pharmacology 1 **Course code: PO 502**

Course Contents		Key elements	Teaching and Learning Methods	Student Assessment Methods
Week # 1	Introduction to general principles of Pharmacology	1.1.1, 1.1.2, 2.1.1, 2.3.1, 2.3.2, 2.3.3, 2.3.4, 2.4.1, 2.4.2, 4.2.2, 4.2.3, 4.2.4	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 2	Introduction to general principles of Pharmacology (cont.)	1.1.1, 1.1.2, 2.1.1, 2.3.1, 2.3.2, 2.3.3, 2.3.4, 2.4.1, 2.4.2, 4.2.2, 4.2.3, 4.2.4	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 3	Pharmacological actions of drugs acting on autonomic nervous system(cont.)	1.1.3, 1.1.4, 2.1.1, 2.1.2, 2.2.1, 2.3.1, 2.3.2, 2.3.3, 2.3.4, 2.4.1, 2.4.2, 3.2.1, 3.2.2, 3.2.3, 4.2.1, 4.2.2, 4.2.3, 4.2.4	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 4	Pharmacological actions of drugs acting on autonomic nervous system (cont.)	1.1.3, 1.1.4, 2.1.1, 2.1.2, 2.2.1, 2.3.1, 2.3.2, 2.3.3, 2.3.4, 2.4.1, 2.4.2, 3.2.1, 3.2.2, 3.2.3, 4.2.1, 4.2.2, 4.2.3, 4.2.4	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 5	Pharmacological actions of	1.1.3, 1.1.4,	Lectures, E-learning,	Written, practical

	drugs acting on autonomic nervous system (cont.)	2.1.1, 2.1.2, 2.2.1, 2.3.1, 2.3.2, 2.3.3, 2.3.4, 2.4.1, 2.4.2, 3.2.1, 3.2.2, 3.2.3, 4.2.1, 4.2.2, 4.2.3, 4.2.4	practical training and class activities	and oral exams
Week # 6	Pharmacological actions of drugs acting on autonomic nervous system (cont.)	1.1.3, 1.1.4, 2.1.1, 2.1.2, 2.2.1, 2.3.1, 2.3.2, 2.3.3, 2.3.4, 2.4.1, 2.4.2, 3.2.1, 3.2.2, 3.2.3, 4.2.1, 4.2.2, 4.2.3, 4.2.4	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 7	**Semseter work**			
Week # 8	Pharmacological actions of drugs acting on cardiovascular system	1.1.5, 1.1.6, 1.1.7, 1.1.8, 2.1.2, 2.3.4, 3.2.2, 3.2.3, 4.2.1, 4.2.2, 4.2.3, 4.2.4	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 9	Pharmacological actions of drugs acting on cardiovascular system (cont.)	1.1.5, 1.1.6, 1.1.7, 1.1.8, 2.1.2, 2.3.4, 3.2.2, 3.2.3, 4.2.1, 4.2.2, 4.2.3, 4.2.4	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 10	Pharmacological actions of drugs acting on cardiovascular system(cont.)	1.1.5, 1.1.6, 1.1.7, 1.1.8, 2.1.2, 2.3.4, 3.2.2, 3.2.3, 4.2.1, 4.2.2, 4.2.3, 4.2.4	Lectures, E-learning, practical training and class activities	Written, practical and oral exams
Week # 11	Pharmacological actions of drugs acting on cardiovascular system (cont.)	1.1.5, 1.1.6, 1.1.7, 1.1.8, 2.1.2, 2.3.4, 3.2.2, 3.2.3,	Lectures, E-learning, practical training, seminars and class	Written, practical and oral exams

		4.2.1, 4.2.2, 4.2.3, 4.2.4	activities	
Week # 12	Pharmacological actions of drugs acting on cardiovascular system (cont.)	1.1.5, 1.1.6, 1.1.7, 1.1.8, 2.1.2, 2.3.4, 3.2.2, 3.2.3, 4.2.1, 4.2.2, 4.2.3, 4.2.4	Lectures, E-learning, seminars and practical training	Written, practical and oral exams
Week # 13	Pharmacological actions of drugs acting on cardiovascular system (cont.)	1.1.5, 1.1.6, 1.1.7, 1.1.8, 2.1.2, 2.3.4, 3.2.2, 3.2.3, 4.2.1, 4.2.2, 4.2.3, 4.2.4	Lectures and E-learning	Written, practical and oral exams
Week # 14	Pharmacological actions of drugs acting on cardiovascular system (cont.)	1.1.5, 1.1.6, 1.1.7, 1.1.8, 2.1.2, 2.3.4, 3.2.2, 3.2.3, 4.2.1, 4.2.2, 4.2.3, 4.2.4	Lectures and E-learning	Written and oral exams
Week # 15	Revision	1.1.5, 1.1.6, 1.1.7, 1.1.8, 2.1.2, 2.3.4, 3.2.2, 3.2.3, 4.2.1, 4.2.2, 4.2.3, 4.2.4	Lectures and E-learning	Written and oral exams

Name and Signature
Course Coordinator

Prof. Dr. Sherin zakaria

Name and Signature
Program Coordinator

Prof. Dr. Abdel Aziz El-Ashmawy

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Course Specification
(2025)

1. Basic Information

Course Title (according to the bylaw)	Biostatistics			
Course Code (according to the bylaw)	PO 501			
Department/s participating in delivery of the course	Pharmacology &Toxicology			
Number of credit hours/points of the course (according to the bylaw)	Theoretical	Practical	Other (specify)	Total
	1	-	-	1
Course Type	Compulsory			
Academic level at which the course is taught	Third Level, semester 1			
Academic Program	Bachelor of Pharmacy (Pharm D)			
Faculty/Institute	Faculty of Pharmacy			
University/Academy	Kafrelsheikh University			
Name of Course Coordinator	Dr. Samar El sebaay			
Course Specification Approval Date	9/2025			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department Council			

2. Course Overview (Brief summary of scientific content)

This course provides basic concepts of biostatistics and data analysis. It includes introduction to descriptive and inferential statistics, interpretation of estimates, confidence intervals and significance tests, elementary concepts of probability and sampling; binomial and normal distribution, basic concepts of hypothesis testing, estimation and confidence intervals, and t-test, linear regression theory and the analysis of variance.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
Domain 1 (FUNDAMENTAL KNOWLEDGE) **1-1- COMPETENCY**		**Upon completion of the course, the student will be able to recognize and display different types of data, apply appropriate statistical tests to compare means and proportions, compute and interpret confidence intervals and p-values, and analyze results using methods such as the two-sample t-test, ANOVA, and alternative tests when assumptions are not met.** **This competency will be developed via the following key elements:**	
1.1.1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	1.1.1	Recognize and illustrate different types of data in public health and clinical studies, and interpret variations in their distributions using visual displays.
		1.1.2	Calculate standard normal scores with their associated probabilities, and compute and interpret confidence intervals for population means and proportions.
		1.1.3	Interpret and explain a p-value, perform a two-sample t-test, and calculate and interpret a 95% confidence interval for the difference in population means.
		1.1.4	Select an appropriate test for comparing two populations on a continuous measure, when the two sample t-test is not appropriate

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
		1.1.5	Understand and interpret results from Analysis of Variance (ANOVA), a technique used to compare means amongst more than two independent populations.
		1.1.6	Choose an appropriate method for comparing proportions between two groups; construct a 95% confidence interval for the difference in population proportions.
DOMAIN 2: PROFESSIONAL AND ETHICAL PRACTICE **2-2- COMPETENCY**		**Upon finishing this course, students will be able to apply different biostatistical designs in the manufacture of pharmaceutical products.** **This competency will be developed via the following key elements:**	
2.2.4	Adopt the principles of pharmaceutical calculations, biostatistical analysis, bioinformatics, pharmacokinetics, and biopharmaceutics and their applications in new drug delivery systems, dose modification, bioequivalence studies, and pharmacy practice.	2.2.1	Use the fundamentals of biological evaluation and methods of biostatistical analysis and pharmaceutical calculation.
2-5- COMPETENCY		**Upon finishing this course, students will be able to contribute in pharmaceutical research studies and clinical trials needed to authorize medicinal products.** **This competency will be developed via the following key elements:**	

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
2.5.3	Contribute in planning and conducting research studies using appropriate methodologies..	2.5.1	Interpret output from the statistical software package related to the various estimation and hypothesis testing procedures during clinical trials and research studies.
Domain 4: Personal Practice **4-1- Competency**		**Upon finishing this course, students will be able to express leadership, time management, critical thinking, problem solving, independent and team working, creativity and entrepreneurial skills.** **This competency will be developed via the following key elements:**	
4.1.1	Demonstrate responsibility for team performance and peer evaluation of other team members, and express time management skills .	4.1.1	Develop critical thinking, problem-solving, creativity, time management and Decision-making abilities to evaluate team performance as well as team members.
		4.1.2	Set realistic targets and time plan to accomplish a required mission in deadlines.
4.1.2	Retrieve and critically analyze information, identify and solve problems, and work autonomously and effectively in a team.	4.1.3	Manipulate unexpected challenges based on statistical designs to work smoothly and effectively individually and in a team.
4.1.3	Demonstrate creativity and apply entrepreneurial skills within a simulated entrepreneurial activity.	4.1.4	Use the knowledge and basis of biostatistics in sales, marketing and management skills to creatively plan and conduct projects that simulate entrepreneurial environment.
4-3- COMPETENCY		**Upon finishing this course, students will be able to express self-awareness and be a life-long learner for continuous professional improvement.** **This competency will be developed via the following key elements:**	
4.3.1	Perform self-assessment to enhance professional and personal competencies.	4.3.1	Analyze information from different sources to improve professional and personal skills

4. Teaching and Learning Methods

1. Lectures
2. Class activities
3. Group discussions and problem solving
4. E. learning
5. Assignment
6. Brainstorming sessions

Course Schedule						
Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments/ Projects/ ...)	Other (to be determined)
1	Introduction to biostatistics and data analysis	1	1	-	-	-
2	Descriptive and inferential statistics	1	1	-	-	-
3	Interpretation of estimates	1	1	-	-	-
4	Confidence intervals and significance tests	1	1	-	-	-
5	Probability and sampling	1	1	-	-	-
6	Binomial and normal distribution	1	1	-	-	-
7	Semester work	-	-	-	-	-
8	Hypothesis testing –basic concepts	1	1	-	-	-
9	Hypothesis testing (cont..)	1	1	-	-	-
10	Estimation and confidence intervals	1	1	-	-	-
11	T-test	1	1	-	-	-
12	Linear regression theory.	1	1	-	-	-
13	Analysis of variance.	1	1	-	-	-
14	Analysis of variance (cont.)	1	1	-	-	-
15	Revision	1	1	-	-	-

5. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (formative exam)	4th week	5	5
2	Periodical exam	7th week	10	10
3	Final Written Exam	16th ,17th	85	85

6. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	**- Course Notes:** Prepared by Pharmacology & Toxicology Department Principles of Biostatistics – Pagano & Gauvreau
	Other References	Biostatistics: A Foundation for Analysis – Daniel WW
	Electronic Sources (Links must be added)	www.biomedcentral.com www.pubmed.com www.medscape.com
	Learning Platforms (Links must be added)	**https://lms3.kfs.edu.eg/pharm/login/index.php**
	Other (to be mentioned)	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Classrooms equipped with smart boards Computers and Internet access Distance learning units Data Show (Projector)

Course Plan

Matrix of course learning outcomes CLOs – Teaching and Learning Strategy and Student Assessment

Course title: Biostatistics Course code: PO 501

Course Contents		Key Elements	Teaching and Learning Methods	Student Assessment Methods
Week # 1	**Introduction to biostatistics and data analysis.**	1.1.1, 2.2.1, 2.5.1, 4.3.1	Lectures	Written Exam
Week # 2	**Introduction to descriptive and inferential statistics**	1.1.1, 2.2.1, 2.5.1, 4.3.1	Lectures	Written Exam
Week # 3	**Interpretation of estimates.**	1.1.1, 2.2.1, 2.5.1, 4.1.1, 4.1.2, 4.1.3, 4.1.4	Lectures and discussion	Written Exam
Week # 4	**Confidence intervals and significance tests.**	1.1.2, 1.1.3, 1.1.6, 2.2.1, 2.5.1, 4.1.1, 4.1.2, 4.1.3, 4.1.4	Lectures and discussion	Written Exam
Week # 5	**Elementary concepts of probability and sampling.**	1.1.1, 1.1.2,1.1.4, 2.2.1, 2.5.1	Lectures	Written Exam
Week # 6	**Binomial and normal distribution.**	1.1.1, 1.1.2, 2.2.1, 2.5.1	Lectures	Written Exam
Week # 7	**Semester Work**			
Week # 8	**Basic concepts of hypothesis testing.**	1.1.3, 1.1.5, 1.1.6, 2.2.1, 2.5.1, 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.3.1	Lectures and brain storming	Written Exam
Week # 9	**Basic concepts of hypothesis testing.**	1.1.3, 1.1.5, 1.1.6, 2.2.1, 2.5.1, 4.1.1,	Lectures	Written Exam

	(cont.)	4.1.2, 4.1.3, 4.1.4, 4.3.1		
Week # 10	**Estimation and confidence intervals.**	1.1.2, 1.1.3, 1.1.6, ,2.2.1, 2.5.1	Lectures	Written Exam
Week # 11	**T-test.**	1.1.3, 1.1.4, 2.2.1, 2.5.1, 4.1.1, 4.1.2, 4.1.3, 4.1.4	Lectures and brain storming	Written Exam
Week # 12	**Linear regression theory.**	1.1.1, 2.2.1, 2.5.1, 4.1.1, 4.1.2, 4.1.3, 4.1.4	Lectures and brain storming	Written Exam
Week # 13	**Analysis of variance.**	1.1.1, 1.1.5, 2.2.1, 2.5.1, 4.3.1	Lectures	Written Exam
Week # 14	**Analysis of variance (cont.)**	1.1.1, 1.1.5,2.2.1, 2.5.1, 4.3.1	Lectures	Written Exam
Week # 15	**Revision**		Lectures, discussion and brain storming	Written exam

Name and Signature
Course Coordinator
Dr. Samar El sebaay

Name and Signature
Program Coordinator
Prof. Dr. Abdel Aziz El-Ashmawy