وحدة ضمان الجودة

Courses Specifications
Faculty of Pharmacy

Bachelor of pharmacy- Pharm D

Program

Third level

2025-2026

وحدة ضمان الجودة

Level 3	
Course Name	**Page no.**
Semester 5	
Pharmacology II	2
Biochemistry II	11
Pharmaceutics III	21
Phytochemistry I	30
Pharmaceutical Microbiology	40
Medicinal Chemistry I	49
Semester 6	
Pharmacology III	59
Pharmaceutics IV	69
Parasitology and Virology	78
Medicinal Chemistry II	88
Phytochemistry II	97
Biopharmaceutics and Pharmacokinetics	107

وحدة ضمان الجودة

Semester 5

COURSE SPECIFICATIONS

Pharmacology II

Third level –Semester 5
2025-2026

Course Specification

(2025-2026)

1. Basic Information

Course Title (according to the bylaw)	Pharmacology II			
Course Code (according to the bylaw)	PO 502			
Department/s participating in delivery of the course	Pharmacology & Toxicology Department			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2 hrs/week	1 hrs/week	-	3 hrs/week
Course Type	Faculty Requirements			
Academic level at which the course is taught	Level 3- semester 5			
Academic Program	Bachelor of Pharmacy (Pharm D)			
Faculty/Institute	Faculty of pharmacy			
University/Academy	Zagazig university			
Name of Course Coordinator	Prof. Dr. Rasha Hassan			
Course Specification Approval Date	18/8/2025			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department Council			

2. Course Overview (Brief summary of scientific content)

On completion of the course, students will be able to:

- Integrate pharmacological principles with fundamental knowledge of physiology and pathophysiology to understand the pharmacokinetics and pharmacodynamics of CNS-acting drugs (sedative-hypnotic, antiepileptic drugs, antiparkinsonian drugs, antipsychotic drugs, antidepressant and antianxiety drugs, opioid analgesics, CNS stimulants and hallucinogens), prostaglandins, leukotrienes, antihistamines, blood-acting drugs, nonsteroidal anti-inflammatory drugs (NSAIDs), antipyretic-analgesics, antihyperlipidemic drugs, hematinic agents as well as drugs used for treating respiratory and GI conditions.
- Select, use, and counsel on appropriate pharmacotherapy for each of the above-mentioned disease conditions, with consideration of patient-specific factors, adverse effects, and contraindications.

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**
1.1.1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	**1.C1.3.1**	Define the pharmacokinetic principles of CNS, respiratory & GIT-acting drugs, antihistamines, blood-acting drugs, NSAIDs, and antihyperlipidemic drugs.
		1.C1.3.2	Describe the mechanisms of action and therapeutic applications of CNS, respiratory & GIT-acting drugs, antihistamines, blood-acting drugs, NSAIDs, and antihyperlipidemic 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.C1.10.1**	Explain drug interactions, contraindications, and adverse effects associated with CNS, respiratory & GIT-acting drugs, antihistamines, blood-acting drugs, NSAIDs, and antihyperlipidemic drugs.
		1.C1.12.1	List the appropriate drug/drug combination for each of the previously stated disease conditions, based on etiology, pathophysiology, and patient-related factors

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**
2.2.1	Isolate, design, identify, synthesize, purify, analyze, and standardize synthetic/ natural pharmaceutical materials.	**2.C2.1.1**	Identify unknown CNS-acting drugs and analgesics by screening and analyzing pharmacological activities demonstrated in experimental animals' videos.
3-1-4	Relate etiology, epidemiology, pathophysiology, laboratory diagnosis, and clinical features of infections/diseases and their pharmacotherapeutic approaches.	**3.C1.4.1**	Outline the pharmacological interventions and select the appropriate drug for specific case scenarios based on etiology, epidemiology, pathophysiology, laboratory findings, and clinical presentation of CNS, GIT, respiratory, blood disorders, and hyperlipidemia.
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.C2.1.1**	Integrate the pharmacological properties of CNS, respiratory & GIT-acting drugs, antihistamines, blood-acting drugs, NSAIDs, and antihyperlipidemic drugs—including mechanisms of action, therapeutic indications, dosing regimens, adverse drug reactions, contraindications, and potential drug-drug and drug-food interactions—into clinical decision-making.
4-1-1	Demonstrate responsibility for team performance and peer evaluation of other team members, and express time management skills	**4.C1.3.1**	Demonstrate effective time management through planning, prioritizing, and executing tasks in an organized and efficient manner to fulfill professional responsibilities
		4.C1.4.1	Retrieve therapeutic recommendations and drug-safety alerts using evidence-based resources.
4-2-1	Demonstrate effective communication skills verbally, non-verbally, and in writing with professional health care team, patients, and communities.	**4.C2.1.1**	Demonstrate effective oral communication skills with the community.

4. Teaching and Learning Methods

1. Lectures (data show, board)
2. Practical sessions
3. Problem solving (Practical)
4. Open discussion (Practical)
5. Case-Based Learning (Practical)
6. Self- learning (Activity)
7. Blended- learning (Activity)
8. Team based Learning (Activity)

5. 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	**Lecture** Central nervous system acting agents Neurodegenerative disorders.	**2**	**2**	**-**	**-**	**-**
	Practical session Lab safety rules	**1**	**-**	**1**	**-**	**-**
2	**Lecture** Sedative-hypnotic and anxiolytic drugs	**2**	**2**	**-**	**-**	**-**
	Practical session Ethics of using experimental animals	**1**	**-**	**1**	**-**	**-**
3	**Lecture** Antipsychotic drugs	**2**	**2**	**-**	**-**	**-**
	Practical session General scheme of identifying unknown drugs on experimental animals (Frogs)	**1**	**-**	**1**	**-**	**-**
4	**Lecture** Antidepressants & drugs for bipolar depression	**2**	**2**	**-**	**-**	**-**

	Formative assessment (quiz1)					
	Practical session General scheme of identifying unknown drugs on experimental animals (mice)	**1**	**-**	**1**	**-**	**-**
5	**Lecture** Antiepileptic drugs	**2**	**2**	**-**	**-**	**-**
	Practical session Screening of CNS depressants in experimental animals (demonstration videos)	**1**	**-**	**1**	**-**	**-**
6	**Lecture** Opioid analgesics	**2**	**2**	**-**	**-**	**-**
	Practical session Screening of CNS stimulants in experimental animals (demonstration videos)	**1**	**-**	**1**	**-**	**-**
7	**Periodical exam**					
8	**Lecture** Central nervous system stimulants Pain control with general and local anesthetics	**2**	**2**	**-**	**-**	**-**
	Practical session Screening of anxiolytic agents in rodents (demonstration videos)	**1**	**-**	**1**	**-**	**-**
9	**Lecture** Autocoids Anti-inflammatory, antipyretic and analgesic drugs	**2**	**2**	**-**	**-**	**-**
	Practical session Screening of antidepressant drugs in rodents (demonstration videos)	**1**	**-**	**1**	**-**	**-**
10	**Lecture** Drugs used in coagulation disorders Drugs used in bleeding disorders **Formative assessment (quiz 2)**	**2**	**2**	**-**	**-**	**-**
	Practical session Screening of analgesics in rodents (demonstration videos) Case studies on anti-parkinson and antidepressant drugs	**1**	**-**	**1**	**-**	**-**

11	**Lecture** - Respiratory system pharmacology Drugs used for treatment of anemia	**2**	**2**	**-**	**-**	**-**
	Practical session Case studies on NSAIDS, and drugs used for treatment of gout, schizophrenia, and epilepsy.	**1**	**-**	**1**	**-***	**-**
12	**Lecture** Gastrointestinal pharmacology **Formative assessment (quiz 3)**	**2**	**2**	**-**	**-**	**-**
	Activity assessment*	**1**	**-**	**1**	**-**	**-**
13	**Lecture** Antihyperlipidemic drugs	**2**	**2**	**-**	**-**	**-**
	Activity assessment*	**1**	**-**	**1**	**-***	**-**
14	**Revision**	**2**	**2**	**-**	**-**	**-**
	Practical exam	**1**	**-**	**1**	**-***	**-**
15	**Final written exam**					

***** In alignment with the self-directed learning objectives of the Pharmacology II curriculum, a segment of the week 11 practical session was dedicated to outlining the guidelines, protocol, and assessment rubric for a required independent activity. **This activity focused on creating campus/community awareness regarding prevalent disease conditions and the proper use and safety alerts of commonly used drugs. Students worked in teams to produce educational videos, communicating key pharmacological concepts to laypeople, thereby integrating team-based learning, self-directed study, and life-long learning skills.** Subsequently, the practical sessions in weeks 12 and 13 were allocated for student presentations of their video projects and investigative reports on assigned topics. Faculty supervisors facilitated in-depth discussions on each presentation, evaluating students on their acquired practical skills, ability to communicate complex information simply, critical interpretation of pharmacological data, and the validity of their conclusions. All submissions were formally assessed against predefined criteria to ensure a rigorous and standardized evaluation of learning outcomes.

6. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (**Periodical Exam**)	Week 7	10	10%
2	Exam 2 ..... (Semester work)	-	-	-
3	Final Written Exam	Week 15	50	50%
4	Final **Practical**/Clinical/… Exam	Weeks 14	25	25%
5	Final Oral Exam	Week 15	10	10%
6	Project (**Self-learning Activity**)	Weeks 12,13	5	5%
7	Assignment (**Formative assessment**)	Weeks 4,10,12	-	-
8	Other (Mention)	-	-	-

7. 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)	Student book and practical notes of "Pharmacology II" approved by the Pharmacology and Toxicology department 2025-2026.
	Other References	**1- Essential Books:** i- Pharmacotherapy preparatory review and recertification course (2024) ii- Basic and clinical pharmacology (16th Edition); Katzung, Mc Graw Hill Lang. (2023). **2- Recommended Books:** i- Lippincott illustrated reviews-pharmacology (8th Edition) (2022). ii- Tripathi Essentials of Medical Pharmacology (8th edition) (2019)
	Electronic Sources (Links must be added)	**https://www.medscape.com/** **www.Pubmed.Com** **https://www.ekb.eg/**
	Learning Platforms (Links must be added) **Electronic platform of Faculty of**	**http://phstudent.eps.zu.edu.eg/Views/StudentViews/StudentLogin**

	Pharmacy- Zagaig University for students	
	Other (to be mentioned)	-
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Computer, board, Conductometer
	Supplies	Chemicals and Glassware
	Electronic Programs	1. Google forms
	Skill Labs/ Simulators	-
	Virtual Labs	-
	Other (to be mentioned)	-

Name and Signature
Course Coordinator

Name and Signature
Head of Department
Prof. Dr. Islam Ahmed

COURSE SPECIFICATION

Biochemistry II

Third year – Semester 5

2025-2026

Course Specification

(2025-2026)

1. Basic Information

Course Title (according to the bylaw)	**Biochemistry II**			
Course Code (according to the bylaw)	**PB503**			
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 hrs/week	**1 hrs/week**	**-**	**3 hrs/week**
Course Type	**Faculty Requirement**			
Academic level at which the course is taught	**level 3/ semester 5**			
Academic Program	**Bachelor of Pharmacy (Pharm D)**			
Faculty/Institute	**Faculty of Pharmacy**			
University/Academy	**Zagazig University**			
Name of Course Coordinator	**Prof. Dr. Hoda Elsayed**			
Course Specification Approval Date	**18/8/2025**			
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 students with knowledge of different metabolic pathways of carbohydrates, lipids, proteins, their inborn errors and integration of metabolism. Also enables them to analyze and interpret experimental results.

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**
1.1.1	**Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.**	**1.C1.3.1**	Outline the principles of absorption, digestion and metabolism of carbohydrates, lipids and proteins and recognize the relation between metabolism and inborn errors of metabolism.
		1.C1.3.2	Demonstrate oxidative stress/antioxidants and their relation to health and diseases.
		1.C1.3.3	Integrate different metabolic pathways and discuss regulatory factors affecting them.
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.C3.1.1**	Handle and dispose biological samples and chemical reagents safely.
3.1.1	**Apply the principles of body functions and basis of genomics in health and disease states to manage different diseases.**	**3.C1.1.1**	Correlate between different metabolic pathways and their role in the pathogenesis of different diseases.
3.1.3	**Monitor and control microbial growth and carry out laboratory**	**3.C1.3.1**	Perform biochemical laboratory tests using biological samples to detect different analytes and metabolites.

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**
	tests for identification of infections/ diseases.	**3.C1.3.2**	Interpret laboratory results in suitable form to achieve an accurate diagnosis.
4.2.2	**Use contemporary technologies and media to demonstrate effective presentation skills**	**4.C2.2.1**	Write and present reports effectively and develop self-learning skills.

4. Teaching and Learning Methods

- Lectures (data show, board)
- Practical sessions
- Interactive learning (open discussion)
- **Self-learning (activity: reports and presentations)**
- **Blended- learning**

5. Course schedule:

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	**Lecture** • Carbohydrates digestion and absorption • Sugar interconversion • Glycolysis (Reactions, steps and regulation)	**2**	**2**	**-**	**-**	**-**
	Practical session • Laboratory safety measures	**2**	**-**	**1**	**-**	**-**

2	**Lecture** • Gluconeogenesis (Reactions and regulation) • Tricarboxylic acid cycle (Reactions, regulation and calculation of energy produced)	**2**	**2**	**-**	**-**	**-**
	Practical session • Glycated hemoglobin and Fructosamine	**2**	**-**	**1**	**-**	**-**
3	**Lecture** • HMP shunt (Reactions and functions) • Uronic acid pathway (Reactions)	**2**	**2**	**-**	**-**	**-**
	Practical session • Lipid profile (triglycerides)	**2**	**-**	**1**	**-**	**-**
4	**Lecture** • Glycogen metabolism • Glycogenesis regulation • Glycogenolysis regulation • Hormonal regulation of carbohydrates metabolism • Inborn errors of metabolism (carbohydrates metabolism)	**2**	**2**	**-**	**-**	**-**
	Practical session • Lipid profile (total cholesterol)	**2**	**-**	**1**	**-**	**-**

5	**Lecture** • Digestion and absorption of lipids • Oxidation of fatty acids • **Formative assessment (quiz 1)**	**2**	**2**	**-**	**-**	**-**
	Practical session • Quantitative determination of serum triglycerides	**2**	**-**	**1**	**-**	**-**
6	**Lecture** • Lipogenesis • Lipolysis in adipose tissues. • Phospholipid metabolism	**2**	**2**	**-**	**-**	**-**
	Practical session • Quantitative determination of serum total cholesterol	**2**	**-**	**1**	**-**	**-**
7	Mid-term Exam					
8	**Lecture** • Ketone bodies and cholesterol metabolism **Formative assessment (quiz 2)**	**2**	**2**	**-**	**-**	**-**
	Practical session • Methods of determination of HDL-c and LDL-c	**2**	**-**	**1**	**-***	**-**
9	**Lecture** • Lipoprotein metabolism • Regulation of lipid metabolism • Inborn errors of metabolism (lipid metabolism)	**2**	**2**	**-**	**-**	**-**
	Practical session • Protein metabolism (urea &creatinine)	**2**	**-**	**1**	**-**	**-**

10	**Lecture** • Protein turnover • Digestion and absorption of dietary proteins. • Nitrogen metabolism • Transamination	**2**	**2**	**-**	**-**	**-**
	Practical session • Quantitative determination of serum urea	**2**	**-**	**1**	**-**	**-**
11	**Lecture** • Deamination • Transdeamination • Metabolism of ammonia • Urea cycle	**2**	**2**	**1**	**-**	**-**
	Practical session • Revision and open discussion	**2**	**-**	**1**	**-**	**-**
12	**Lecture** • Conversion of amino acids to specialized products metabolism	**2**	**2**	**-**	**-**	**-**
	Practical exam	**2**	**-**	**1**	**-**	**-**
13	**Lecture** • Conversion of amino acids to specialized products (continue) • Regulation of proteins metabolism • Inborn errors of metabolism (proteins metabolism) • **Formative assessment (quiz 3)**	**2**	**2**	**-**	**-**	**-**
	Practical session • Activity presentation and assessment	**2**	**-**	**1**	**-***	**-**

14	**Lecture** • Revision and open discussion	**2**	**2**	-	-	-
	Practical session • Activity presentation and assessment	**2**	-	**1**	**-***	-
15	**Final exam**	-	-	**-**	-	-

* As part of a self-learning activity in Biochemistry II, a part of practical session in week 8 was specified for the explanation of activity guidelines, rules and assessment rubric. Also, practical sessions in weeks 13 and 14 were facilitated for students to present their reports on the various activity self-learning topics according to the announced student distribution on topics. Supervisors engaged students in a discussion to evaluate the key skills acquired findings, and conclusions they reached. The activity was formally evaluated against a set of established criteria to ensure a rigorous and consistent assessment**.**

6. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (Mid-term Exam)	**Week 7**	**10**	**10%**
2	Exam 2 ..... (Semester work)	-	-	-
3	Final Written Exam	**Week 15**	**50**	**50%**
4	Final **Practical**/Clinical/… Exam	Weeks 12	25	25%
5	Final Oral Exam	**Week 15**	**10**	**10%**
6	Project (**Self-learning Activity**)	Weeks 13,14	5	5%
7	**Assignment (Formative assessment)**	**Weeks 5,8,13**	**-**	**-**
8	Other (Mention)	**-**	**-**	**-**

7. 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)	• Student book of Biochemistry II approved by biochemistry department 2025 -2026. • Practical notes of Biochemistry II approved by biochemistry department 2025- 2026. • Marks' basic medical biochemistry: a clinical approach (6th Edition); Lieberman M., Marks A.D., Peet MD, Alisa. (2022). • Lehninger principles of biochemistry (eighth edition); Nelson D.L.; Cox M.M. (2021). • Basic concepts in biochemistry (2nd Edition); Gilbert H.F.; The McGraw Hill companies Inc. (2000). • Lippincott's Illustrated Reviews: Biochemistry (eighth edition); Abali E.E; Cline S.D; Franklin D.S; Viselli S.M. (2021)
	Other References	• Biochemistry (Seventh Edition); Garrett R.H. and Grisham C.M.; Thomson learning, Inc (2024). • Harper's Illustrated Biochemistry (32nd edition); RodwellV.W., Bender D., BothamK.M., KennellyP.J., Weil P. A.(2022). • Clinical Biochemistry made ridiculously simple (4th edition); Stephen Goldberg. M.D.; Med Master Inc. (2023).
	Electronic Sources (Links must be added)	• Egyptian J. of biochem. and molecular biology (https://ejb.journals.ekb.eg/). • Egyptian Pharmaceutical Journal (https://epj.journals.ekb.eg/). • Pubmed (https://pubmed.ncbi.nlm.nih.gov/). • Science direct (https://www.sciencedirect.com/).
	Learning Platforms (Links must be added) Electronic platform of Faculty of Pharmacy- Zagaig University for students	• **https://shorturl.at/sar8D**
Supportive facilities & equipment for	**Devices/Instruments**	- **Data show** - **White board** - **Spectrophotometer**
	Supplies	- **Test tubes** - **Ependorf tubes**

teaching and learning		- **Beakers** - **Chemical kits**
	Electronic Programs	- **Microsoft office** - **Microsoft teams**
	Skill Labs/ Simulators	- **--**
	Virtual Labs	- **--**
	Other (to be mentioned)	- **--**

Name and Signature **Course Coordinator** **Prof. Dr. Hoda Elsayed**	**Name and Signature** **Head of Department** **Ass. Prof. Rana Eissa**

COURSE SPECIFICATIONS

Pharmaceutics III

Third level –Semester 5
2025-2026

Course Specification

(2025-2026)

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 department			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2 hrs/week	1 hr/week	-	3 hrs/week
Course Type	Faculty Requirements			
Academic level at which the course is taught	Level 3- semester 5			
Academic Program	Bachelor of Pharmacy (Pharm D)			
Faculty/Institute	Faculty of pharmacy			
University/Academy	Zagazig university			
Name of Course Coordinator	Prof.Dr. Azza Ali Hasan Soliman			
Course Specification Approval Date	18/8/2025			
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 describe the principles and techniques involved in the formulation, manufacturing and quality control test of oral dosage forms (powders, granules, tablets, capsules) and parenteral 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**
1.1.1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	**1.C1.2.1**	Outline the preparation, ingredients, ideal characteristics, and Quality Control of different solid pharmaceutical dosage forms; powders, granules, tablets, capsules and suppositories.
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.C2. 2.1**	Apply proper methodologies for safe and effective formulation, compounding, production, packaging, labeling, storing, dispensing, and distributing different solid pharmaceutical dosage forms: powders, granules, tablets, capsules, and suppositories.
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.C3. 1.1**	Handle and dispose of chemicals, solvents, and other hazardous products in an appropriate way, avoiding any environmental hazards.
		2.C3. 2.1	Apply GLP guidelines for safe handling and disposal of pharmaceutical materials and products.
4.1.1	Demonstrate responsibility for team performance and peer evaluation of other team members, and express time management skills.	**4.C1. 3.1**	Manage time as evidenced by the ability to plan and implement efficient mode of working.

4. Teaching and Learning Methods

1. Lectures (data show, board)
2. Practical sessions
3. Self-learning (Activity)

5. 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	**Lecture** **Tablets** - Definition, types of tablets - Advantages, disadvantages - Main excipients (diluents, binders, disintegrants, lubricant)	**2**	**2**	**-**	**-**	**-**
	Practical session - Tablets preparation	**2**	**-**	**1**	**-**	**-**
2	**Lecture** - Methods of preparations (direct method, granulation by compression, wet granulation) - Tableting Problems.	**2**	**2**	**-**	**-**	**-**
	Practical session -Tableting problems - Angle of repose	**2**	**-**	**1**	**-**	**-**
3	**Lecture** - Quality control ; chemical (potency, content uniformity, purity) and physical (weight variation, thickness, hardness, friability, disintegration, dissolution)	**2**	**2**	**-**	**-**	**-**
	Practical session - Evaluation of tablets - Tablets coating	**2**	**-**	**1**	**-**	**-**
4	**Lecture** - Tablet coating: advantages and disadvantages, (sugar coating, modified	**2**	**2**	**-**	**-**	**-**

	sugar coating, compression coating, film coating and aqueous polymeric film coating) -Assignment (**Formative assessment**)					
	Practical session - Granules -Calculation of effervescent granules -Blank effervescent granules	**2**	**-**	**1**	**-**	**-**
5	**Lecture** **<u>Powders and granules</u>** -Definitions -Powders and granules as dosage forms -Advantaged and disadvantages	**2**	**2**	**-**	**-**	**-**
	Practical session - Heambiotic effervescent granules	**2**	**-**	**1**	**-**	**-**
6	**Lecture** - Powders and granules - Flow properties, blending of powders, packaging, special problems arises during manufacture, - Granules (definition, advantages, and effervescent granules).	**2**	**2**	**-**	**-**	**-**
	Practical session - Antispasmodic effervescent granules	**2**	**-**	**1**	**-**	**-**
7	**Lecture** **<u>Capsules</u>** - Definition, types (hard and soft gelatin capsules), advantages, and disadvantages - Hard gelatin capsules: composition of the shell, Types of excipients, limitations. - Different sizes of capsules -Stability of hard gelatin capsule	**2**	**2**	**-**	**-**	**-**
	Practical session - Antigout effervescent granules	**2**	**-**	**1**	**-**	**-**
8	**Midterm exam**					
9	**Lecture** - Quality Control Tests of capsules: Disintegration test, Weight variation test, Dissolution test and content uniformity.	**2**	**2**	**-**	**-**	**-**

	- Methods of preparation					
	Practical session - Suppositories -Calculation of displacement value	**2**	**-**	**1**	**-**	**-**
10	**Lecture** - Soft Gelatin Capsule, advantages and disadvantages, preparation. - Comparison between Hard and soft gelatin Capsules - Vegicaps Soft Capsules - Enteric coated capsules: - Sustained release capsules; Spansule and medules. -Assignment (**Formative assessment**)	**2**	**2**	**-**	**-**	**-**
	Practical session - Preparation of Boric acid Glycero- gelatin suppositories	**2**	**-**	**1**	**-**	**-**
11	**Lecture** - Suppositories -Definition -Characters of ideal bases -Advantages and disadvantages of suppositories	**2**	**2**	**-**	**-**	**-**
	Practical session - Preparation of Iodine Glycero- gelatin suppositories -Activity student (Report)	**2**	**-**	**1**	**-***	**-**
12	**Lecture** - Bases of suppositories	**2**	**2**	**-**	**-**	**-**
	Practical session -Preparation of glycerin soap suppositories -Activity student (Report)	**2**	**-**	**1**	**-***	**-**
13	**Lecture** - Preparation of Suppositories	**2**	**2**	**-**	**-**	**-**
	Practical exam	**2**	**-**	**1**	**-**	**-**
14	**Lecture** - Problems in preparations of suppositories	**2**	**2**	**-**	**-**	**-**
	Practical session ----------	**-**	**-**	**-**	**-**	**-**
15	**Final written exam**					

***** As part of a self-learning activity in pharmaceutics III course, a part of practical session in week 10 was specified for the explanation of activity guidelines, rules and assessment rubric. Also, practical sessions in weeks 11 and 12 were facilitated for students to present their reports on the various activity self-learning topics according to the announced student distribution on topics. Supervisors engaged students in a discussion to evaluate the key skills acquired, findings, and conclusions they reached. The activity was formally evaluated against a set of established criteria to ensure a rigorous and consistent assessment.

6. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (**Mid-term Exam**)	Week 8	10	10%
2	Exam 2 ..... (Semester work)	-	-	-
3	Final Written Exam	Week 15	50	50%
4	Final **Practical**/Clinical/… Exam	Week 13	25	25%
5	Final Oral Exam	Week 15	10	10%
6	Project (**Self-learning Activity**)	Weeks 11,12	5	5%
7	Assignment (**Formative assessment**)	Weeks 4,10	-	-
8	Other (Mention)	-	-	-

7. 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)	Student book and practical notes of "Pharmaceutics III" approved by the pharmaceutics department 2025-2026.
	Other References	- John, C., & Morten, C. (2002). The Science of Dosage Form Design. Aulton: Modified release peroral dosage forms (2nd ed.) Churchill Livingstone, 290-300. - Augsburger, L. L., & Hoag, S. W. (2008). Rational design and formulation. Informa Healthcare USA. - Savva, M. (2019). Pharmaceutical Calculations. Cham, Switzerland: Springer International Publishing. - Sharp, J. (2004). Good pharmaceutical manufacturing practice: rationale and compliance. CRC Press. - Allen, L., & Ansel, H. C. (2013). Ansel's pharmaceutical dosage forms and drug delivery systems. Lippincott Williams & Wilkins. - Avis, K. E. (Ed.). (2018). Pharmaceutical dosage forms: parenteral medications. Routledge. - Turco, S. J., & King, R. E. (1979). Sterile dosage forms: their preparation and clinical application.
	Electronic Sources (Links must be added)	- www.researchgate.net - www.speciation.net - www.ncbi.nlm.nih.gov - http//www.lib.utexas.edu/etd/d/2003/codyk036/codyk036.pdf - http://en.wikipedia.org/wiki/Code-switching
	Learning Platforms (Links must be added) **Electronic platform of Faculty of Pharmacy-Zagaig University for students**	**https://shorturl.at/sar8D**
	Other (to be mentioned)	-

Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Computer, board, data show
	Supplies	Chemicals, glassware, digital balance, water baths
	Electronic Programs	2. Microsoft office 3. Microsoft teams
	Skill Labs/ Simulators	-
	Virtual Labs	-
	Other (to be mentioned)	-

Name and Signature **Course Coordinator**	**Name and Signature** **Head of Department**
Prof.Dr. Azza Ali Hasan Soliman	**Prof.Dr. Sehreen Ahmed Sabry**

COURSE SPECIFICATION

Pytochemistry-I

Third level- Semester 5

2025/2026

Course Specification

(2025-2026)

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			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2 hrs/week	1 hrs/week	-	3 hrs/week
Course Type	Faculty Requirements			
Academic level at which the course is taught	Level 3/ Semester 5			
Academic Program	Bachelor of Pharmacy (Pharm D)			
Faculty/Institute	Faculty of Pharmacy			
University/Academy	Zagazig university			
Name of Course Coordinator	Prof Dr. Azza El-Shafae			
Course Specification Approval Date	18/8/2025			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department Council			

2. Course Overview (Brief summary of scientific content)

The course 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.

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**
1.1.1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	1.C1.2.1	Define and classify selected natural products (volatile oils, resins, terpenoids, bitters, carbohydrates, and glycosides) with their physical properties.
		1.C1.2.2	Describe the chemistry of the above-mentioned classes, their pharmacological properties (biological activities), and contraindications.
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.C1.9.1	Identify different analytical techniques used in natural products determination for the above-mentioned classes, their methods of isolation, purification, and identification.
		1.C1.9.2	Identify natural and pharmaceutical products containing volatile oils, resins, miscellaneous terpenoids, bitters of plant or animal origin, carbohydrates and glycosides of plant or animal origin.
2.2.1	Isolate, design, identify, synthesize, purify, analyze, and standardize synthetic/ natural pharmaceutical materials.	2.C2.1.1	Examine different volatile oils, resins, miscellaneous terpenoids, bitters of plant or animal origin,

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**
			carbohydrates and glycosides of plant or animal origin and apply different methods for their isolation and identification.
		2.C2.1.2	Predict the appropriate method for isolation, purification, and identification of different volatile oils, resins, miscellaneous terpenoids, bitters of plant or animal origin, carbohydrates and glycosides of plant.
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.C2.5.1	Appropriate method for isolation, purification and identification of different volatile oils, resins, miscellaneous terpenoids, bitters of plant or animal origin, carbohydrates and glycosides of plant or animal origin
2.3.1	Retrieve and critically analyze information, identify, and solve problems, and work autonomously and effectively in a team.	2.C3.1.1	Handle basic laboratory equipment and chemicals effectively and safely.
3.2.3	Provide evidence-based information about safe use of complementary medicine including phytotherapy, aromatherapy, and nutraceuticals.	3.C2.3.1	Retrieve the information necessary to provide recommendations about efficacy, toxicity, side effects or interactions of naturally occurring products (volatile oils, resins, miscellaneous terpenoids, bitters of plant or animal origin, carbohydrates and glycosides of plant or animal origin).
4.1.1	Demonstrate responsibility for team performance and peer evaluation of other team members, and express time management skills.	4.C1.3.1	Work effectively as part of a team by managing time efficiently and planning tasks effectively.
4.2.2	Use contemporary technologies and media to demonstrate effective presentation skills.	4.C2.2.1	Implement writing and presentation skills

4. Teaching and Learning Methods

1. Lectures (data show, board)
2. Practical session
3. Self-learning.
4. Cooperative learning.
5. Field visits.

5. 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/ .....)	Cooperative learning and Field visit (Tasks/ Assignments/ Projects/ ...)	Other (to be determined)
1	**Lecture** **Volatile oils** • Introduction • Development of cosmetic formulations (cream) enriched with essential oils from natural herbs as an innovative approach to bridge the gap between academia and the professional market	**2**	**2**	**-**	**-**	**-**
	Practical session - Preparation of volatile oils -Determination of the purity of volatile oils	**2**	**-**	**1**	**-**	**-**
2	**Lecture** **Volatile oils** Terpene Hydrocarbons	**2**	**2**	**-**	**-**	**-**
	Practical session • Chemical tests for identification of volatile oils	**2**	**-**	**1**	**-**	**-**
3	**Lecture** **Volatile oils** Oxygenated terpenes **Formative assessment (quiz1)**	**2**	**2**	**-**	**-**	**-**
	Practical session Development of cosmetic formulations	**2**	**-**	**1**	**-***	**-**

	(cream) enriched with essential oils from natural herbs as an innovative approach to bridge the gap between academia and the professional market **Activity:** - Get a copy of pamphlets for pharmaceutical products containing volatile oils					
4	**Lecture** **-Carbohydrates** Definition, classification, properties, evaluation, drugs containing carbohydrates	**2**	**2**	**-**	**-**	**-**
	Practical session -General properties of carbohydrates -Chemical tests for monosaccharides	**2**	**-**	**1**	**-**	**-**
5	**Lecture** **- Carbohydrates** Heteropolysaccharides and holopolysaccharides.	**2**	**2**	**-**	**-**	**-**
	Practical session -Chemical tests for disaccharides and polysaccharides	**2**	**-**	**1**	**-***	**-**
6	**Lecture** **Glycosides** Classification, isolation, and properties	**2**	**2**	**-**	**-**	**-**
	Practical session -Application of chemical tests for carbohydrates in pharmaceutical products **-Activity:** Get a copy of pamphlets for pharmaceutical products containing carbohydrates -Lab research report on different classes studied in the theoretical part	**2**	**-**	**1**	**-**	**-**
7	**Midterm exam**					
8	**Lecture** **Glycosides** Phenolic glycosides, cyanogenic glycosides, thioglycosides	**2**	**2**	**-**	**-**	**-**
	Practical session General properties of glycosides and extraction methods	**2**	**-**	**1**	**-**	**-**

9	**Lecture** **Glycosides** Cardiac glycosides.	**2**	**2**	**-**	**-**	**-**
	Practical session -Chemical tests for cardiac glycosides, flavonoids, and coumarins	**2**	**-**	**1**	**-***	**-**
10	**Lecture** **Glycosides** Flavonoids and coumarins **Formative assessment (quiz 2)**	**2**	**2**	**-**	**-**	**-**
	Practical session - Chemical tests for Anthraquinones and saponins.	**2**	**-**	**1**	**-**	**-**
11	**Lecture** - **Glycosides** Anthraquinones, saponins, and miscellaneous glycosides	**2**	**2**	**-**	**-**	**-**
	Practical session Application of chemical tests for glycosides, bitters, and resins in pharmaceutical products **Activity:** -Get a copy of pamphlets for pharmaceutical products containing glycosides, bitters, and resins.	**2**	**-**	**1**	**-**	**-**
12	**Lecture** **Bitter principles, Resins, and resin combinations**	**2**	**2**	**-**	**-**	**-**
	Practical exam	**2**	**-**	**1**	**-**	**-**
13	**Lecture** - **Miscellaneous terpenoids / Natural carotenoids**	**2**	**2**	**-**	**-**	**-**
	Practical exam	**2**	**-**	**1**	**-**	**-**
14	**Lecture** General discussion and revision	**2**	**2**	**-**	**-**	**-**
	-	**-**	**-**	**-**	**-**	**-**
15	**Final written exam**					

* In this activity, groups of 3–5 students will collect pamphlets of pharmaceutical products containing volatile oils, resins, terpenoids, bitters, carbohydrates, and glycosides, then prepare a 5–10 minute oral presentation covering plant sources, active ingredients, dosage forms, drug interactions, mode of action, and related chemical structures. The task promotes cooperative learning, as students collaborate and share responsibilities, and can be enriched by field visits, which provide real-world exposure to pharmaceutical products and link theoretical knowledge with practice.

6. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (**Mid-term Exam**)	Week ٧	10	10%
3	Final Written Exam	Week 15	50	50%
4	Final **Practical**/Clinical/… Exam	Weeks 12 and 13	25	25%
5	Final Oral Exam	Week 15	10	10%
6	Project (Cooperative learning and Field visits activity).	Weeks 3, 6, 11	5	5%
7	Assignment (**Formative assessment**)	Weeks 3, 10	-	-

7. 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)	Clinical student book of Phytochemistry I, approved by Pharmacognosy Department 2025-2026.
	Other References	1. Egbuna, C., Kumar, S., Ifemeje, J. C., &Kurhekar, J. V. (Eds.). (2018). *Phytochemistry: Volume 2: Pharmacognosy, Nanomedicine, and Contemporary Issues*. CRC Press. 2. Nakanishi, K., Goto, T., &Itô, S. (Eds.). (2013). *Natural products chemistry* (Vol. 1). Academic press. 3. Rahman, A. U. (2012). *Studies in natural products chemistry/edited by Atta-ur-Rahman*. Amsterdam; New York: Elsevier. 4. Islam, Shahid Ul, and Javid Ahmad Banday, eds. *Chemistry of Biologically Potent Natural Products and Synthetic Compounds*. John Wiley & Sons, 2021. 5. Srivastava, Nishi, Arti Singh, Puja Kumari, Jay Hind Nishad, Veer Singh Gautam, Monika Yadav, Rajnish Bharti, Dharmendra Kumar, and Ravindra N. Kharwar. "Advances in extraction technologies: Isolation and purification of bioactive compounds from biological materials." In *Natural bioactive compounds*, pp. 409-433. Academic Press, 2021
	Electronic Sources (Links must be added)	Fitoterapia, Die Pharmazie, Journal of Natural Products, Phytochemistry and Planta medica http://www.elsevier.com/phytochem http://www.elsevier.com/phytomed

		http://www.wiley.co.uk. http:// www.sciencedirect.com
	Learning Platforms (Links must be added) **Electronic platform of Faculty of Pharmacy- Zagazig University for students**	**https://shorturl.at/sar8D**
	Other (to be mentioned)	-
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Computer and board
	Supplies	Chemicals and Glassware
	Electronic Programs	4. Microsoft Office 5. Microsoft Teams
	Skill Labs/ Simulators	-
	Virtual Labs	-
	Other (to be mentioned)	-

Name and Signature
Course Coordinator
Prof Dr. Azza El-Shafae

Name and Signature
Acting Head of Department
Prof. Dr. Amal El-Gendy

COURSE SPECIFICATIONS

Pharmaceutical Microbiology

Third level- Semester 5

2025/2026

Course Specification

(2025-2026)

1. Basic Information

Course Title (according to the bylaw)	Pharmaceutical Microbiology			
Course Code (according to the bylaw)	PM 502			
Department/s participating in delivery of the course	Microbiology and Immunology Department			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2 hr	1 hr	-	3 hr
Course Type	Faculty Requirements			
Academic level at which the course is taught	level 3/ semester 5			
Academic Program	Bachelor of Pharmacy-Pharm D			
Faculty/Institute	Faculty of Pharmacy			
University/Academy	Zagazig University			
Name of Course Coordinator	Prof. Dr. Fathy serry			
Course Specification Approval Date	18/8/2025			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	- Department council			

2. Course Overview (Brief summary of scientific content)

On completion of the course, the student will be able to:

On completion of the course, this course enables students to Illustrate the different types of antimicrobial agents as well as the sources and control of microbial contamination of the pharmaceutical products and Outline the concepts of sterilization, its different methods, applications and sterility testing.

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**
1.1.1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioural, administrative, and clinical sciences.	**1.C1.2.1**	Outline the principles of pharmaceutical microbiology: sterility testing and sterility assurance
1.1.2	Utilize the proper pharmaceutical and medical terms, abbreviations and symbols in pharmacy practice	**1.C1.8.1**	Outline the basic concepts of sterilization, its different methods and its applications & different types of antimicrobial agents and their mechanism of action
1.1.4	Articulate knowledge from fundamental sciences to explain drugs' actions and evaluate their appropriateness, effectiveness, and safety in individuals and populations	**1.C1.12.1**	Illustrate the concepts of microbiological quality control of pharmaceutical products and evaluation of preservatives
2.3.1	Demonstrate responsibility for team performance and peer evaluation of other team members, and express time management skills.	**2.C3.1.1**	Handle basic biohazards and chemicals effectively and safely.

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**
2.3.2	Recognize and adopt ethical, legal, and safety guidelines for handling and disposal of biologicals, and pharmaceutical materials/products	**2.C3.2.1**	Apply GLP guidelines for safe handling and disposal of pharmaceutical materials and products & Advise health care professionals and patients for rational use of drugs and problems of misuse of antimicrobial agents
3.1.2	Apply the principles of public health and pharmaceutical microbiology to select and assess proper methods of infection control.	**3.C1.2.**1	Select the appropriate preservative for effective formulation of pharmaceutical preparations Select the most suitable antimicrobial agent to promote the community health
3.1.3	Monitor and control microbial growth and carry out laboratory tests for identification of infections/ diseases.	**3.C1.3.**1	Apply GMP guidelines in preparation of pharmaceutical products & Analyza and interpret expremental results in suitable form
3.1.4	Relate etiology, epidemiology, pathophysiology, laboratory diagnosis, and clinical features of infections/diseases and their pharmacotherapeutic approaches	**3.C1.4.**1	Select the most suitable antimicrobial agent for each infection and avoid misuse of antibiotics
4.2.2	Use contemporary technologies and media to demonstrate effective presentation skills.	**4.C2.2.**1	Communicate efficiently with patient, public, and health care professional & Work effectively as a member of a team, developing good communication skills

4. Teaching and Learning Method

1. Lectures
2. Practical sessions
3. Self-learning
4. Microsoft Teams

5. 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	**Lecture** Control of microorganisms by sterilization and survival curve	2	2	-	-	-
	Practical session Laboratory safety Measures	2	-	1	-	-
2	**Lecture** Methods of sterilization and sterilizers	2	2	-	-	-
	Practical session Sterility testing	2	-	1	-	-
3	**Lecture** Sterilization of pharmaceutical products Antibiotic susceptibility testing: Kirby-Bauer method	2	2	-	-	-
	Practical session Antibiotic susceptibility testing: Kirby-Bauer method	2	-	1	-	-
4	**Lecture** Sterilization control and sterility testing **Formative assessment (quiz 1)**	2	2	-	-	-
	Practical session Practical determination MIC by broth dilution	2	-	1	-	-
5	**Lecture** sterilization parameters and sterility assurance	2	2	-	-	-
	Practical session Practical determination MIC by agar dilution	2	-	1	-	-

6	**Lecture** Disinfection and antisepsis: chemical agents used as disinfectant and antiseptic Factors affecting the activity of disinfectant and antiseptic Evaluation of disinfectant and antiseptic	**2**	**2**	**-**	**-**	**-**
	Practical session Practical AB Assay	**2**	**-**	**1**	**-**	**-**
7	**Periodical exam**					
8	**Lecture** - Sources of microbial contamination and spoilage of pharmaceutical products and factors affecting them Control of microbial spoilage Good Manufacture Practice	**2**	**2**	**-**	**-**	**-**
	Practical session *Determination Temp coefficient*	**2**	**-**	**1**	**-**	**-**
9	**Lecture** Preservation of pharmaceutical products and preservatives commonly used Factors affecting preservative activity Evaluation of preservative's efficacy	**2**	**2**	**-**	**-**	**-**
	Practical session *Determination concentration coefficient*	**2**	**-**	**1**	**-**	**-**
10	**Lecture** Introduction - Definitions and terminology Antibiotic and chemotherapeutic agents Mechanisms of action of antimicrobial agents **Formative assessment (quiz 2)**	**2**	**2**	**-**	**-**	**-**
	Practical session PrepaDetermination of heat killed vaccin vaccine Formative assessment (quiz	**2**	**-**	**1**	**-**	**-**

	2)					
11	**Lecture** Classification of antimicrobial agents: Drugs acting on cell wall Drugs acting on cell membrane Methods of sterilization and sterilizers	**2**	**2**	**-**	**-**	**-**
	Practical session Determination of phenol-coefficient: Chick-Martin method Activity (Poster)*	**2**	**-**	**1**	**-**	**-**
12	**Lecture** Classification of antimicrobial agents: Drugs inhibiting protein synthesis Drugs inhibiting nucleic acid synthesis Antimetabolites **Formative assessment (quiz 3)**	**2**	**2**	**-**	**-**	**-**
	Practical session Determintion of phenol-coefficient by 3radial walker	**2**	**-**	**1**	**-**	**-**
13	**Lecture** Antituberculous drugs Antileprosy agents Antifungal drugs	**2**	**2**	**-**	**-**	**-**
	Practical test	**2**	**-**	**1**	**-**	**-**
14	**Lecture** Antiprotozoal drugs Antiviral drugs	**2**	**2**	**-**	**-**	**-**
	Practical session Discussion and Assessment of activity	**2**	**-**	**1**	**-**	**-**
15	**Final exam**					

6. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (Mid-term Exam)	Week 7	10	10%
2	Exam 2 ..... (Semester work)	-	-	-
3	Final Written Exam	Week 15	50	50%
4	Final **Practical**/Clinical/… Exam	Weeks 13	25	25%
5	Final Oral Exam	Week 15	10	10%
6	Project (**Self-learning Activity**)	Weeks 11,14	5	5%
7	Assignment (**Formative assessment**)	Weeks 4 &10&12	-	-
8	Other (Mention)	-	-	-

7. 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: "Notes on Pharmaceutical Microbiology" Essential Books (Text Books) * Hugo WB and Russell AD "Pharmaceutical Microbiology" 9th edn, Blackwell Scientific Editions; London (2015).
	Other References	*"Sterilization, Disinfection and Preservation" 8th edn, Ed Block SS, Lippincott Williams & Wilkins, London (2019). *"Antibiotics in Laboratory Medicine", 9th edition, Ed Lorian V, Williams and Wilkins, Baltimore (2019). *"Molecular Biotechnology", Pasternak G, ASM press, Washington DC (2016).
	Electronic Sources (Links must be added)	http://medicaleducationonline.org/ http://medicaleducationonline.org/ http://www.parasitesonline.net http://pathmicro.med.sc.edu/book/parasit-sta.htm http://www.dpd.cdc.gov/dpdx/HTML/Para_Health.htm
	Learning Platforms (Links must be added)	http://phstudent.eps.zu.edu.eg/Views/StudentViews/StudentLogin

	Other (to be mentioned)	**-**
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Black (white) boards, overhead projectors and data show
	Supplies	Chemicals, Autoclaves, Incubators, Ovens, Water bathes, staining dyes, microscopes, refrigerators and microbiological culture media
	Electronic Programs	Microsoft office Microsoft teams
	Skill Labs/ Simulators	**-**
	Virtual Labs	**-**
	Other (to be mentioned)	**-**

*** The list mentioned is an example, the institution may add and/or delete depending on the nature of the course**

Name and Signature **Course Coordinator** **Prof. Dr. Fathy Serry**	**Name and Signature** **Head of Department** **Ass.Prof. Moamen Askoura**

COURSE SPECIFICATIONS

Medicinal I

Third level –Semester 5
2025-2026

Course Specification

(2025-2026)

1. Basic Information

Course Title (according to the bylaw)	Medicinal Chemistry I			
Course Code (according to the bylaw)	PC 501			
Department/s participating in the delivery of the course	Medicinal Chemistry Department			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2 hrs/week	1 hrs/week	-	3 hrs/week
Course Type	Faculty Requirements			
Academic level at which the course is taught	Level 3- semester 5			
Academic Program	Bachelor of Pharmacy (Pharm D)			
Faculty/Institute	Faculty of Pharmacy			
University/Academy	Zagazig University			
Name of Course Coordinator	Asst. Prof. Dr. Ahmed Samy			
Course Specification Approval Date	18/8/2025			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department Council			

2. Course Overview (Brief summary of scientific content)

On completion of the course, the student will be able to demonstrate physicochemical properties of drugs in relation to biological action, total synthesis, mechanism of action, adverse reactions, and explain the basics of medicinal chemistry through identification of the chemistry and uses of different drug classes (antibacterial agents, antiviral agents, antifungal agents, antiparasitic agents, and antineoplastic agents).

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**
1.1.1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	**1.C1.2.1.**	Identify the chemistry and physicochemical properties of different drug classes (antibacterial, antiviral, antifungal, antiparasitic, and antineoplastic agents).
		1.C1.2.2.	Recognize the mode of action & SAR of different drug classes (antibacterial, antiviral, antifungal, antiparasitic, and antineoplastic agents).
1.1.3	Integrate knowledge from fundamental sciences to handle, identify, extract, design, prepare, analyze, and assure the quality of synthetic/ natural pharmaceutical materials/products.	**1.C1.9.1.**	Outline synthetic pathways of drugs and determine the principles of analysis of the drugs, in the presence of degradation products, metabolites, or impurities, using a reference source (book, journal).
2.2.1	Isolate, design, identify, synthesize, purify, analyze, and standardize synthetic/ natural pharmaceutical materials.	**2.C2.1.1.**	Apply the quantitative and qualitative methodology of authentic and pharmaceutical samples.

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**
2.3.2	Recognize and adopt ethical, legal, and safety guidelines for handling and disposal of biologicals and pharmaceutical materials/products.	**2.C3.2.1**	Apply GLP guidelines in handling pharmaceutical preparations & laboratory equipment.
4.1.2	Retrieve and critically analyze information, identify and solve problems, and work autonomously and effectively in a team.	**4.C1.4.1.**	Demonstrate skill in accessing and evaluating information from a variety of sources.

4. Teaching and Learning Methods

1. Lectures (data show, board)
2. Practical sessions
3. Self- Learning (Activity)
4. Blended learning
5. Flipped classroom

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	**Lecture** Antibacterial agents, Antibiotics (cell wall synthesis inhibitors and cell membrane disruptors).	**2**	**2**	**-**	**-**	**-**
	Practical session - Laboratory safety measures Limit test introduction	**2**	**-**	**1**	**-**	**-**
2	**Lecture** Antibacterial agents, Antibiotic (protein synthesis and nucleic acid synthesis .inhibitors)	**2**	**2**	**-**	**-**	**-**
	Practical session Limit test for chloride, limit test for sulphate.	**2**	**-**	**1**	**-**	**-**
3	**Lecture** Antibacterial agents, Antimycobacterial agents (8-, and 4-aminoquinoline derivatives, sesquiterpene alkaloids, Methanol-quinoline derivatives, antibiotics) **Formative assessment (quiz1)**	**2**	**2**	**-**	**-**	**-**
	Practical session Limit test for lead & iron	**2**	**-**	**1**	**-**	**-**
4	**Lecture** Introduction to Medicinal Chemistry (Nomenclature of drugs, Physicochemical properties, structural features, biological activity, and biological isosteres)	**2**	**2**	**-**	**-**	**-**
	Practical session Limit test applications: limit test for Heavy metals (lead) in ampicillin capsule	**2**	**-**	**1**	**-**	**-**
5	**Lecture** Antiviral agents	**2**	**2**	**-**	**-**	**-**

	Practical session Limit test applications: limit test for chloride and sulphate in streptomycin samples.	**2**	**-**	**1**	**-**	**-**
6	**Lecture** Antifungal agents **Formative assessment (quiz2)**	**2**	**2**	**-**	**-**	**-**
	Practical session Limit test applications: limit test for Chloride in chloramphenicol eye drops	**2**	**-**	**1**	**-**	**-**
7	**Midterm exam**					
8	**Lecture** Antiparasitic agents (Antimalarials (4-amino quinolines, 8-aminoquinolines, acridine derivatives, biguanides, and pyrimidine derivatives) & Antiprotozoal agents (antitrichomonal, antigiardial agents, antileshmanial and antitrypanosomal agents).	**2**	**2**	**-**	**-**	**-**
	Practical session Limit test applications: limit test for sulphate in gentamycin sulphate injection	**2**	**-**	**1**	**-**	**-**
9	**Lecture** Antiparasitic agents (Anthelmintics (drugs active for trematodes, nematodes, cestodes, and antibelharzials), Antiprotozoal agents (antiamoebic agents).	**2**	**2**	**-**	**-**	**-**
	Practical session Test for heavy metals, test for purity.	**2**	**-**	**1**	**-**	**-**
10	**Lecture** Antineoplastic agents	**2**	**2**	**-**	**-**	**-**
	Practical session Limit test applications: Limit tests for chloride and sulphate in ferrous gluconate - Orientation on Activity	**2**	**-**	**1**	**-***	**-**
11	**Lecture** Sulphonamides	**2**	**2**	**-**	**-**	**-**
	Practical session -Limit test applications: Limit tests for lead in ferrous gluconate.	**2**	**-**	**1**	**-**	**-**

12	**Lecture** Antiseptics and disinfectants (alcohols, aldehydes, acids, oxidizing agents).	**2**	**2**	**-**	**-**	**-**
	Practical exam	**2**	**-**	**1**	**-**	**-**
13	**Lecture** Antiseptics and disinfectants (chlorine-containing compounds, phenolic compounds, cationic surfactants, dyes, nitrofurans derivatives, & fluoroquinolones	**2**	**2**	**-**	**-**	**-**
	Practical exam	**2**	**-**	**1**	**-**	**-**
14	**Lecture** Revision	**2**	**2**	**-**	**-**	**-**
	Practical session Discussion and Assessment of activity	**2**	**-**	**1**	**-***	**-**
15	**Final written exam**					

***As part of a self-learning activity in medicinal chemistry I course, a part of practical session in week 10 was specified for the explanation of activity guidelines, rules and assessment rubric. Also, practical sessions in week 14 were facilitated for students to present their reports on the various activity self-learning topics according to the announced student distribution on topics. Supervisors engaged students in a discussion to evaluate the key skills acquired, findings, and conclusions they reached. The activity was formally evaluated against a set of established criteria to ensure a rigorous and consistent assessment.

6. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of Total Course Marks
1	Exam 1written (**Mid-term Exam**)	Week 7	10	10%
2	Exam 2 ..... (Semester work)	-	-	-
3	Final Written Exam	Week 15	50	50%
4	Final **Practical**/Clinical/… Exam	Weeks 12 and 13	25	25%
5	Final Oral Exam	Week 15	10	10%
6	Project (**Self-learning Activity**)	Weeks 10, 14	5	5%

7	Assignment (**Formative assessment**)	Weeks 3,6	-	-
8	Other (Mention)	-	-	-

7. 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)	Student book and practical notes of "Medicinal chemistry I" approved by the analytical chemistry department, 2025-2026.
	Other References	[1] G. L. Patrick, An Introduction to Medicinal Chemistry, Seventh Edition. Oxford University Press, 2023. [2] D. A. Williams, W. O. Foye, and T. L. Lemke, Foye's principles of medicinal chemistry, 8th edition. Lippincott Williams & Wilkins, 2019. [3] C. O. Wilson, O. Gisvold, J. N. Delgado, and W. A. Remers, Wilson and Gisvold's textbook of organic medicinal and pharmaceutical chemistry, 12th edition. Lippincott-Raven, 2011. [4] D. P. R. Donald J. Abraham, "Burger's medicinal chemistry, drug discovery, and development", 7th Edition. Wiley 2010. [5] M. J. O'Neil, The Merck index: an encyclopedia of chemicals, drugs, and biologicals, 15th Edition. RSC Publishing, 2013. [6] J. P. Remington, Remington: the science and practice of pharmacy, 21st edition. Lippincott Williams & Wilkins, 2006.
	Electronic Sources (Links must be added)	https://www.ekb.eg/ http://chemwiki.ucdavis.edu/ www.Pubmed.Com and www.sciencedirect.com http://www.pharmacopoeia.co.uk
	Learning Platforms (Links must be added) **Electronic platform of the Faculty of Pharmacy- Zagazig**	https://phstudent.eps.zu.edu.eg/Views/StudentViews/StudentLogin?fbclid=IwY2xjawL6FF1leHRuA2FlbQIxMABicmlkETE4NnETkJETktxTE52Rm9nAR6zscxpvbG66rStVoyb6l8uGS6Z03ZEIUMZ6Y__tuPx3ubMLmazZAG0U8NQ_aem_gV2eGYHV6FitgTMHUgIlA

	University for students	
	Other (to be mentioned)	-
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Computer, board
	Supplies	Chemicals and Glassware
	Electronic Programs	1. Microsoft Office 2. Microsoft Teams
	Skill Labs/ Simulators	-
	Virtual Labs	-
	Other (to be mentioned)	-

Name and Signature Course Coordinator	Name and Signature Head of Department
Asst. Prof. Dr/ Ahmed Samy	**Prof. Dr/ Hend Kothayer**

Semester 6

COURSE SPECIFICATIONS

Pharmacology III

Third year – semester 6
2025-2026

Course Specification

(2025-2026)

1. Basic Information

Course Title (according to the bylaw)	Pharmacology III			
Course Code (according to the bylaw)	PO 603			
Department/s participating in delivery of the course	Pharmacology & Toxicology Department			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2 hrs/week	1 hrs/week	-	3 hrs/week
Course Type	Faculty Requirements			
Academic level at which the course is taught	Level 3- semester 6			
Academic Program	Bachelor of Pharmacy-Pharm D			
Faculty/Institute	Faculty of pharmacy			
University/Academy	Zagazig university			
Name of Course Coordinator	Prof. Dr. Islam Ahmed			
Course Specification Approval Date	17-2-2026			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department Council			

2. Course Overview **(Brief summary of scientific content)**

On completion of the course, students will be able to explain and state the principles of endocrine pharmacotherapy; explain and integrate the pharmacological properties of endocrine drugs including mechanisms of drug actions, adverse reactions, contraindications and drug-drug interactions. In addition, the students should be able to gather and evaluate endocrine treatment guidelines from academic databases and med-lines for treatment of endocrine disorders. Furthermore, the students should be able to select the appropriate medication therapy for endocrine disorders based on its etiology, laboratory diagnosis, and clinical features.

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**
1.1.1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	**1.C1.3.1**	Define the pathophysiological implications of major endocrine hormones, including thyroid, parathyroid, adrenal, pancreatic, pituitary, and gonadal hormones.
1-1-4	Articulate knowledge from fundamental sciences to explain drugs' actions and evaluate their appropriateness, effectiveness, and safety in individuals and populations.	**1.C1.10.1**	Describe the mechanisms of action, pharmacokinetics, indications, contraindications, adverse effects, and drug interactions of hormone-related drugs
		1.C1.11.1	Integrate pharmacological knowledge to select appropriate therapeutic agents for disease management and patient counseling

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.C1.12.1	Evaluate drug therapy options based on patient-specific factors and evidence-based guidelines for endocrine and reproductive disorders.
2.4.3	Take actions to solve any identified medicine-related and pharmaceutical care problems	**2.C4.3.1**	Identify drug interactions, toxicities, and risk management strategies related to hormonal therapies
3-1-4	Relate etiology, epidemiology, pathophysiology, laboratory diagnosis, and clinical features of infections/diseases and their pharmacotherapeutic approaches.	**3.C1.4.1**	Evaluate the appropriateness of medicines for a given disease based on etiology, possible interactions and patient-related factors (e.g., renal/hepatic impairment, age, comorbidities)
		3.C1.4.2	Interpret laboratory and diagnostic data relevant to endocrine and reproductive diseases to inform pharmacotherapy decisions.
4-1-1	Demonstrate responsibility for team performance and peer evaluation of other team members, and express time management skills	**4.C1.3.1**	Demonstrate effective time management by showcasing the capability to design and execute a structured and productive workflow
4-1-2	Retrieve and critically analyse information, identify and solve problems, and work autonomously and effectively in a team.	**4.C1.5.1**	Demonstrate critical thinking, problem-solving and decision-making abilities in treatment of endocrine disorders
4-2-2	Demonstrate responsibility for team performance and peer evaluation of other team members, and express time management skills	**4.C2.3.1**	Demonstrate good information technology skills as well as presentation skills.

4. Teaching and Learning Methods

1. Lectures (data show, board)
2. Practical sessions
3. Problem solving (Practical)
4. Open discussion (Practical)
5. Case-Based Learning (Practical)
6. Self- learning (Activity)
7. Blended- learning (Activity)
8. Team based Learning (Activity)

5- 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	**Lecture** Introduction to endocrine hormones	**2**	**2**	**-**	**-**	**-**
	Practical session Identification of academic databases	**2**	**-**	**1**	**-**	**-**
2	**Lecture** Thyroid Hormone and Parathyroid Hormone	**2**	**2**	**-**	**-**	**-**
	Practical session Case studies on drugs used for Thyroid disorders. Case studies on drugs used for Parathyroid disorders. Treatment guidelines for thyroid and parathyroid disorders.	**1**	**-**	**1**	**-**	**-**
3	**Lecture** Minerals and corticosteroids	**2**	**2**	**-**	**-**	**-**
	Practical session Case studies on drugs used for bone and mineral hemostasis Regulators Case studies on Drugs Affecting Calcium Balance Treatment guidelines for Bone and mineral disorders Treatment guidelines for corticosteroids (Activity)	**1**	**-**	**1**	**-**	**-**
4	**Lecture** Pituitary gland Hormones**Formative assessment (quiz1)**	**2**	**2**	**-**	**-**	**-**

	Practical session Case studies on Anterior Pituitary Hormones; Oxytocin and Other Drugs Acting on Uterus. Case studies on drugs used for Treatment of pituitary gland disorders	**1**	**-**	**1**	**-**	**-**
5	**Lecture** Gonadal hormones	**2**	**2**	**-**	**-**	**-**
	Practical session Case studies on drugs used for gonadal disorders. Case studies on Androgens Case studies on Estrogens, Progestins. Treatment guidelines for gynecological disorders (Activity)	**1**	**-**	**1**	**-**	**-**
6	**Lecture** Contraception	**2**	**2**	**-**	**-**	**-**
	Practical session Case studies on drugs used for contraception.	**1**	**-**	**1**	**-**	**-**
7	**Periodical exam**					
8	**Lecture** Menstrual disorders: pregnancy-associated conditions	**2**	**2**	**-**	**-**	**-**
	Practical session Case studies on Menstrual disorders Case studies on Menstrual disorders, Postmenopausal (Activity)	**1**	**-**	**1**	**-**	**-**
9	**Lecture** Obesity and polycystic ovary syndrome	**2**	**2**	**-**	**-**	**-**
	Practical session Case studies obesity and polycystic ovary syndrome	**1**	**-**	**1**	**-**	**-**

10	**Lecture** Diabetes: introduction**Formative assessment (quiz 2)**	**2**	**2**	**-**	**-**	**-**
	Practical session Case studies on screening and diagnosis of diabetes.	**1**	**-**	**1**	**-**	**-**
11	**Lecture** Diabetes: treatment	**2**	**2**	**-**	**-**	**-**
	Practical session Case studies on insulin Case studies on Oral Hypoglycemic Drugs and Glucagon Treatment guidelines for diabetes. (Activity)	**1**	**-**	**1**	**-***	**-**
12	**Lecture** Diabetes complications 1**Formative assessment (quiz 3)**	**2**	**2**	**-**	**-**	**-**
	Practical session Case studies on Oral Hypoglycemic Drugs and Glucagon Treatment guidelines for diabetes	**1**	**-**	**1**	**-**	**-**
13	**Lecture** Diabetes complications 11	**2**	**2**	**-**	**-**	**-**
	Activity assessment*	**1**	**-**	**1**	**-***	**-**
14	**Revision**	**2**	**2**	**-**	**-**	**-**
	Practical exam	**1**	**-**	**1**	**-***	**-**
15	**Final written exam**					

6-Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (**Periodical Exam**)	Week 7	10	10%
2	Exam 2 ..... (Semester work)	-	-	-
3	Final Written Exam	Week 15	50	50%
4	Final **Practical**/Clinical/… Exam	Weeks 14	25	25%
5	Final Oral Exam	Week 15	10	10%
6	Project (**Self-learning Activity**)	Weeks 3,5,8,11	5	5%
7	Assignment (**Formative assessment**)	Weeks 4,10,12	-	-
8	Other (Mention)	-	-	-

7-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)	Student book and practical notes of "Pharmacology III " approved by the Pharmacology and Toxicology department 2025-2026.
	Other References	**1- Essential Books:** i- Pharmacotherapy preparatory review and recertification course (2024) ii- Basic and clinical pharmacology (16th Edition); Katzung, Mc Graw Hill Lang. (2023). iii. Applied therapeutics, 12th Edition, Mary-Ann Koda-Kimble ,2023 **2- Recommended Books:** i- Lippincott illustrated reviews-pharmacology (8th Edition) (2022). ii- Tripathi Essentials of Medical Pharmacology (8th

		edition) (2019)
	Electronic Sources (Links must be added)	**https://www.medscape.com/** **www.Pubmed.Com** **https://www.ekb.eg/** **The American Society Clinical Pharmacology Therapeutics (ASCPT) http://www.ascpt.org/,**
	Learning Platforms (Links must be added) **Electronic platform of Faculty of Pharmacy- Zagaig University for students**	**http://phstudent.eps.zu.edu.eg/Views/StudentViews/StudentLogin**
	Other (to be mentioned)	-
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Computer, board, Conductometer
	Supplies	-
	Electronic Programs	1. Google forms
	Skill Labs/ Simulators	-
	Virtual Labs	-
	Other (to be mentioned)	-

Name and Signature **Course Coordinator**	**Name and Signature** **Head of Department** Prof. Dr. Islam Ahmed

COURSE SPECIFICATIONS

Pharmaceutics IV

Third year – semester 6
2025-2026

Course Specification

(2025-2026)

1. Basic Information

Course Title (according to the bylaw)	**Pharmaceutics IV**			
Course Code (according to the bylaw)	PT 606			
Department/s participating in delivery of the course	Pharmaceutics Department			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2 hrs/week	1 hr/week		3 hrs/week
Course Type	**Faculty requirement**			
Academic level at which the course is taught	level 3			
Academic Program	Bachelor of Pharmacy (Pharm D)			
Faculty/Institute	**Faculty: Pharmacy**			
University/Academy	**University: Zagazig**			
Name of Course Coordinator	**Prof. Mahmoud Abdelghany**			
Course Specification Approval Date	**8/18/2025**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Pharmaceutics department council**			

2. Course Overview (Brief summary of scientific content)

On completion of the course, the student will be able to explain different sterile dosage forms including principles of formulation, development, sterilization, packaging and quality control testing of parenteral, ophthalmic, aerosol and implants.

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**
1-1-1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	1.C1.2.1	Describe properties, advantages and disadvantages of different sterile dosage forms including parenterals, ophthalmics, aerosols and implants.
		1.C1.2.2	Integrate pharmaceutical knowledge for proper formulation of different sterile dosage forms including parenterals, ophthalmics, aerosols and implants.
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.C2.2.1	Describe formulation procedures, packaging as well as sterilization methods, and quality control tests required for characterization of different sterile dosage forms
4-1-2	Retrieve and critically analyze information, identify and solve problems, and work autonomously and effectively in a team	4.C1.4.1	Retrieve and evaluate the information necessary to provide recommendations in relation to the management of patients.

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.C1.5.1	Develop problem solving skills including problem identification and design of management plan.

4. Teaching and Learning Methods

1. Lectures
2. Practical session (problem solving, co-operative learning & case study)
3. Self-learning: activity as report preparation about pharmacokinetics of certain drugs

5. 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	**Lecture:** **Ophthalmic dosage forms:** Identify factors affecting drug availability to the eye	**2**	**2**	**-**	**-**	**-**
	Practical: Problem solving on isotonic solutions	**2**	**-**	**1**	**-**	**-**
2	**Lecture:** Describe different conventional ocular dosage forms	**2**	**2**	**-**	**-**	**-**
	Practical: Problem solving on isotonic solutions (continued)	**2**	**-**	**1**	**-**	**-**
3	**Lecture:** non-conventional ophthalmic preparations	**2**	**2**	**-**	**-**	**-**
	Practical: Electrolyte solutions: Milliequivalents, Milimoles and Milliosmoles	**2**	**-**	**1**	**-**	**-**
	Formative assessment					
4	**Lecture:** Pharmaceutical aerosols: - Advantages - components	**2**	**2**	**-**	**-**	**-**
	Practical: Electrolyte solutions: Milliequivalents, Milimoles and Milliosmoles (cont.)	**2**	**-**	**1**	**-**	**-**
5	**Lecture:** Introduction of parentrals Advantages & disadvantages of parenterals - -	**2**	**2**	**-**	**-**	**-**

	Practical: Intravenous Infusions, Parenteral Admixtures, and Rate-of-Flow Calculations	**2**	-	**1**	-	-
6	**Lecture:** Requirements for parenteral preparations - Routes of parenteral administration -Classification of parenteral preparations	**2**	**2**	-	-	-
	Practical: Intravenous Infusions, Parenteral Admixtures, and Rate-of-Flow Calculations (cont.)	**2**	-	**1**	-	-
	Formative assessment					
7	**Lecture:** Sterilization techniques moist heat , dry heat, radiation, gas and filtration	**2**	**2**	-	-	-
	Practical: Case study	**2**	-	**1**	-	-
8	**Midterm**					
9	**Lecture:** Packaging of parentrals. -Quality control tests of parentral preparations	**2**	**2**	-	-	-
	Practical: Parenteral admixtures	**2**	-	**1**	-	-
10	**Lecture:** Introduction to implants Advantages & disadvantages -	**2**	**2**	-	-	-
	Practical: Parenteral Nutrition	**2**	-	**1**	-	-
11	**Lecture:** - Classification of implants and methods of preparation.	**2**	**2**	-	-	-
	Practical: Revision	**2**	-	**1**	-	-

12	**Lecture:** Quality control of implants	**2**	**2**	**-**	**-**	**-**
	Practical: Activity (report)	**2**	**-**	**1**	**-**	**-**
13	**Lecture:**	**2**	**2**	**-**	**-**	**-**
	Practical Exam	**2**	**-**	**1**	**-**	**-**
14	**Lecture:** - Requirements of implants production	**2**	**2**	**-**	**-**	**-**
	Practical: Open discussion	**2**	**-**	**2**	**-**	**-**
15	**Final exam**					

6-Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (midterm exam)	**Week 7**	**10**	**10%**
2	Exam 2 ..... (Semester work)	**-**	**-**	**-**
3	Final Written Exam	**Week 15**	**50**	**50%**
	Final Practical/Clinical/… Exam	**Week 13**	**25**	**25%**
	Final Oral Exam	**Week 15**	**10**	**10%**
	Project (self learning activity)	**Week 12**	**5**	**5%**
	Assignments	**Week 3,6**	**-**	**-**
	Other (Mention)	**-**	**-**	**-**

*** The methods mentioned are examples, the organization may add and/or delete**

7-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)	**Student book & practical note for Cosmetics approved 2025-2026**
	Other References	Ansel's Pharmaceutical Dosage Forms and Drug Delivery System. Loyd V. Allen, Jr., Timothy B. McPherson · Wolters Kluwer Health Publisher. 2021 Pharmaceutical dosage forms: Parenteral medications vol. 1, 2nd edn, Dekker, 1992. -Sterile Dosage Forms: Their preparation and clinical application. Ed., Salvatore Turco, Publisher: Lippincott Williams and Wilkins (1994). -Good pharmaceutical manufacture practice, rational and compliance, Jhon Sharp, CRC press (2019)
	Electronic Sources (Links must be added)	- www.researchgate.net - www.speciation.net - www.ncbi.nlm.nih.gov - http//www.lib.utexas.edu/etd/d/2003/codyk036/codyk df - http://en.wikipedia.org/wiki/Code-switching
	Learning Platforms (Links must be added)	
	Other (to be mentioned)	- Pharmaceutics: The Science, Practice, and Future of Pharmacy. Dr. Alankar Shrivastav , Dr. Pawan Singh · Chyren Publication. 2025 - Martin's Physical Pharmacy and Pharmaceutical Sciences. Ed. Patrick J. Sinko (2023). Publisher: Lippincott Williams and Wilkins - Remington; the Science and Practice of Pharmacy (23rd edition). Publisher: Lippincott Williams and Wilkins. (2020) USP (797) Pharmaceutical Compounding—Sterile Preparations

Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	
	Supplies	
	Electronic Programs	Laptops, calculators, Microsoft office
	Skill Labs/ Simulators	-
	Virtual Labs	-
	Other (to be mentioned)	-

*** The list mentioned is an example, the institution may add and/or delete depending on the nature of the course**

Name and Signature
Course Coordinator
Prof. Hanan Elnahas

Name and Signature
Program Coordinator
Prof.Shereen sabry

COURSE SPECIFICATIONS

Parasitology and Virology

Third year – semester 6
2025-2026

Course Specification

(2025-2026)

1. Basic Information

Course Title (according to the bylaw)	Parasitology & Virology			
Course Code (according to the bylaw)	PM 603			
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 hr	1 hr	-	3 hr
Course Type	Faculty Requirements			
Academic level at which the course is taught	Level 3- semester 6			
Academic Program	Bachelor of Pharmacy (Pharm D)			
Faculty/Institute	Faculty of Pharmacy			
University/Academy	Zagazig University			
Name of Course Coordinator	Prof. Dr. Nehal Yousef			
Course Specification Approval Date	18/8/2025			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	department council			

2. Course Overview (Brief summary of scientific content)

On completion of the course, students will be able to:

On completion of the course, this course enables students to understand human parasitic diseases, focusing on parasite biology, diagnosis, treatment, and control. This course also covers medical helminthology, protozoology, entomology, lab diagnosis, and virology topics including, virus structure, replication, classification, and prevention.

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**
1-1-1-	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	**1.C1.3**	Explain the principles of parasitology. Summarize the principles of virology and diseases caused by viruses.
1-1-2-	Utilize the proper pharmaceutical and medical terms, abbreviations and symbols in pharmacy practice	**1.C1.8**	Use the proper terms of parasitology and virology and abbreviations in medical practice
1-1-4-	Articulate knowledge from fundamental sciences to explain drugs' actions and evaluate their appropriateness, effectiveness, and safety in individuals and populations.	**1.C1.12**	Recognize etiology, epidemiology and clinical features of different diseases caused by parasites and viruses and assess the efficacy of drugs for these clinical cases.
3-1-3-	Monitor and control microbial growth and carry out laboratory tests for identification of infections/ diseases.	**3.C1.3**	Perform microscopical examination of different parasitic stages and viruses from different specimens.
4-1-1	Demonstrate responsibility for team performance and peer evaluation of other team members, and express time management skills.	**4.C1.3**	Demonstrate critical thinking, decision-making and problem-solving in dealing with case study.
4-2-2	Use contemporary technologies and media to	**4.C2.2**	Communicate efficiently in oral and written manner.

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**
	demonstrate effective presentation skills.		

4. Teaching and Learning Methods

- Lectures (data show, board)
- Practical sessions
- Problem solving (Practical)
- Self- learning (Activity)

5. 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	**Lecture** General Introduction	**2**	**2**	**-**	**-**	**-**
	Practical session General terms of parasitology	**2**	**-**	**1**	**-**	**-**
2	**Lecture** Helminthology a-Trematodes -General characters -Fasciola species	**2**	**2**	**-**	**-**	**-**
	Practical session Parasitological laboratory examination: Sample collection Evaluation of different techniques used in the diagnosis of parasitic infections:	**2**	**-**	**1**	**-**	**-**
3	**Lecture** Heterophyes Schistosoma Case report	**2**	**2**	**-**	**-**	**-**
	Practical session -Demonstration of microscopic slides of -Fasciola species -Heterophyes species -Schistosoma species -Demonstration of Snails hosts	**2**	**-**	**1**	**-**	**-**
4	**Lecture** **Cestodes**: o General characters o Taenia saginata o Taenia solium o Cysticercosis	**2**	**2**	**-**	**-**	**-**

	Case report **Formative assessment (quiz 1)**					
	Practical session Demonstration of microscopic slides of: o Taenia saginata Taenia solium	**2**	**-**	**1**	**-**	**-**
5	**Lecture** Echinococcus sp. Hymenolepis sp. Diphyllobothrium sp. **Nematodes**:` • General characters • Ascaris lumbricoides • Hook worm sp	**2**	**2**	**-**	**-**	**-**
	Practical session Demonstration of microscopic slides of : • Echinococcus sp. • Ascaris lumbricoides • Hook worm sp. Activity (report)	**2**	**-**	**1**	**-**	**-**
6	**Lecture** • Enterobius & Trichuris • Trichinella spiralis • Wuchereria species • Case report	**2**	**2**	**-**	**-**	**-**
	Practical session Demonstration of microscopic slides of • Enterobius & Trichuris • Trichinella spiralis • Wuchereria species	**2**	**-**	**1**	**-**	**-**

7	**Lecture** Leishmania species Protozology Amoebae species Balantidium coli Giardia lamblia Trichomonas vaginalis Case report Trypanosoma species	**2**	**2**	**-**	**-**	**-**
	Practical session . morphologic stages of: Amoebae species Balantidium coli	**2**	**-**	**1**	**-**	**-**
8	Periodical exam					
9	**Lecture** Leishmania species Trypanosoma species Case report	**2**	**2**	**-**	**-**	**-**
	Practical session Giardia lamblia Trichomonas vaginalis	**2**	**-**	**1**	**-**	**-**
10	**Lecture** Plasmodium species Toxoplasma gondii Case study **Formative assessment (quiz 2)**	**2**	**2**	**-**	**-**	**-**
	Practical session Leishmania species Trypanosoma gondii Lab. Diagnosis of parasitic infections	**2**	**-**	**1**	**-**	**-**
11	**Lecture** **Introduction to Virology**: - General properties, Morphology, replication, Cultivation, classification of viruses Diagnosis of viral infection Immune response to viral infection Chemotherapy and prevention	**2**	**2**	**-**	**-**	**-**

	of viral diseases					
	Practical session Plasmodium species Toxoplasma gondii Lab. Diagnosis of parasitic infections Orientation on activity **Activity: Poster about life cycle of parasite**	**2**	**-**	**1**	**-**	**-**
12	**Lecture** **DNA viruses** (Poxviruses, Herpes simplex viruses, Varicella-Zoster virus, Human cytomegalovirus) **Formative assessment (quiz 3)**	**2**	**2**	**-**	**-**	**-**
	Practical exam	**2**	**-**	**1**	**-**	**-**
13	**Lecture** **RNA viruses** (Measles, Mumps, Rubella, Hepatitis, Poliovirus, Rhinovirus, Zika virus, Rabies common cold+ Practical exam	**2**	**2**	**-**	**-**	**-**
	Practical session Discussion and Assessment of activity	**2**	**-**	**1**	**-**	**-**
14	**Lecture** **RNA viruses** (Rota virus, HIV viruses, Ebola virus, Corona virus)	**2**	**2**	**-**	**-**	**-**
	Practical session Discussion and Assessment of activity	**2**	**-**	**1**	**-**	**-**
15	**Final written exam**					

6-Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (Mid-term Exam)	Week 7	10	10%
2	Exam 2 ..... (Semester work)	-	-	-
3	Final Written Exam	Week 15	50	50%
4	Final **Practical**/Clinical/… Exam	Weeks 12	25	25%
5	Final Oral Exam	Week 15	10	10%
6	Project (**Self-learning Activity**)	Weeks 11,13,14	5	5%
7	Assignment (**Formative assessment**)	Weeks 4 &10&12	-	-
8	Other (Mention)	-	-	-

7-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)	* Student book of Parasitology approved by Microbiology and Immunology department & practical notes by staff of the department (2025). *Medical Parasitology (eleventh edition); Markell and Voge's, W.B. Saunders Company (2021). *District Laboratory practice in Tropical countries. *MONICA CHEESBROUGH, Printed in Great Britain at University press, Cambridge (2020). *Clinical Parasitology (ninth Edition); Beaver, P.C.; Jung, R.C. and Cupp, E.W. Lea & Febiger; Philadelphia (2019).
	Other References	*Manson's Tropical Diseases (23rd edition), Cook GC (ed), London: WB Saunders (2024).
	Electronic Sources (Links must be added)	• EKB (https://www.ekb.eg/) • Egyptian J. of biochem. and molecular biology (https://ejb.journals.ekb.eg/).

		• Egyptian Pharmaceutical Journal (https://epj.journals.ekb.eg/). • Pubmed (https://pubmed.ncbi.nlm.nih.gov/). Science direct (https://www.sciencedirect.com/).
	Learning Platforms (Links must be added)	**https://teams.microsoft.com/l/channel/19%3A5cf4ed1e90044c9ab3e2b**
	Other (to be mentioned)	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	- **For lectures:** Black (white) boards, data show and classrooms. - **For Labs.:** data show and worm slides.
	Supplies	-

*** The list mentioned is an example, the institution may add and/or delete depending on the nature of the course**

Course Coordinator

Prof. Dr. Nehal Yousef.

Head of Department

Ass.Prof. Moamen Askoura

COURSE SPECIFICATIONS

Medicinal Chemistry II

Third year – semester 6
2025-2026

Course Specification

(2025-2026)

1. Basic Information

Course Title (according to the bylaw)	Medicinal Chemistry II			
Course Code (according to the bylaw)	PC 602			
Departments participating in the delivery of the course	Medicinal Chemistry Department			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2 hrs/week	1 hrs/week	-	3 hrs/week
Course Type	Faculty Requirements			
Academic level at which the course is taught	Level 3- semester 6			
Academic Program	Bachelor of Pharmacy (Pharm D)			
Faculty/Institute	Faculty of Pharmacy			
University/Academy	Zagazig University			
Name of Course Coordinator				
Course Specification Approval Date	18/8/2025			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department Council			

2. Course Overview (Brief summary of scientific content)

On completion of the course, students will be able to study various Medicinal Chemistry aspects of the drugs acting on the central and peripheral nervous systems and related cardiovascular drugs. The following topics will be addressed: Medicinal chemistry of general

anaesthetics, anxiolytics, antiepileptics, antipsychotics, antidepressants, anti-Parkinsonism agents, anti-Alzheimer's agents, autonomic drugs, antihypertensive agents, antianginal agents, antiarrhythmic agents, antihyperlipidemic agents, and diuretics.

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**
1.1.1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	**1.C1.2.1.**	Identify the chemistry and physicochemical properties of different drug classes (Drugs acting on autonomic nervous system, CVS drugs, CNS depressants drugs, Central nervous system stimulants and Diuretics)
		1.C1.2.2.	Recognize mode of action & SAR of different drug classes (Drugs acting on autonomic nervous system, CVS drugs, CNS depressants drugs, Central nervous system stimulants and Diuretics)
1.1.3	Integrate knowledge from fundamental sciences to handle, identify, extract, design, prepare, analyze, and assure the quality of synthetic/ natural pharmaceutical materials/products.	**1.C1.9.1.**	Outline synthetic pathways of drugs and determine the principles of analysis of the drugs, in presence of degradation products, metabolites, or impurities using a reference source (book, journal).
2.2.1	Isolate, design, identify, synthesize, purify, analyze, and standardize synthetic/ natural pharmaceutical materials.	**2.C2.1.1.**	Synthesize, purify, and analyze synthetic pharmaceutical materials.
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.C2.6.1**	Carry out pharmaceutical calculations with precision

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**
2.3.1	Handle, identify, and dispose biologicals, synthetic/natural materials, biotechnology-based and radiolabelled products, and other materials/products used in pharmaceutical field.	**2.C3.1.1**	Handle chemicals, solvents, and hazardous products in the appropriate way.
2.3.2	Recognize and adopt ethical, legal, and safety guidelines for handling and disposal of biologicals, and pharmaceutical materials/products.	**2.C3.2.1**	Apply GLP guidelines in handling pharmaceutical preparations & laboratory equipment.
4.1.2	Retrieve and critically analyze information, identify and solve problems, and work autonomously and effectively in a team.	**4.C1.5.1.**	Develop problem solving and critical thinking skills.

4. Teaching and Learning Methods

1. Lectures (data show, board)
2. Practical sessions
3. Problem solving (Practical)
4. Self- Learning (Activity)
5. Blended learning

5. 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	**Lecture** CNS depressant drugs: -Sedatives and hypnotics (general anesthetics)	**2**	**2**	**-**	**-**	**-**
	Practical session Lab safety rules & Setting Chemical Reaction (Synthesis of different compounds, e.g., Aspirin, Chlorothiazide)	**2**	**-**	**1**	**-**	**-**
2	**Lecture** Anxiolytics & antiepileptics Major tranquilizer	**2**	**2**	**-**	**-**	**-**
	Practical session Tracking Chemical Reaction (Physical & Chemical detection of salicylic acid)	**2**	**-**	**1**	**-**	**-**
3	**Lecture** -Drugs acting on the autonomic nervous system: sympathomimetic agents	**2**	**2**	**-**	**-**	**-**
	Practical session Separation and Purification (Demonstration of different purification techniques)	**2**	**-**	**1**	**-**	**-**
4	**Lecture** -Sympathomimetic agents -Parasympathomimetic agents **Formative assessment (quiz1)**	**2**	**2**	**-**	**-**	**-**
	Practical session Structure Elucidation (e.g., Aspirin vs Salicylic acid)	**2**	**-**	**1**	**-**	**-**
5	**Lecture** Parasympathomimetic agents: cholinergic antagonists Adrenergic blocking agents	**2**	**2**	**-**	**-**	**-**
	Practical session Assay of certain compounds (Functional Group Analysis)	**2**	**-**	**1**	**-**	**-**
6	**Lecture** Antiparkinsonism agents, Anti-Alzheimer's agents	**2**	**2**	**-**	**-**	**-**

	Practical session Assay of Anticoagulant drugs (Aspirin)	**2**	**-**	**1**	**-**	**-**
7	**Lecture** Central nervous system stimulants: -analeptics	**2**	**2**	**-**	**-**	**-**
	Practical session Assay of CVS-acting drugs (Nicotinic acid - Procainamide hydrochloride)	**2**	**-**	**1**	**-**	**-**
8	**Midterm exam**					
9	**Lecture** - Central sympathomimetic agents and psychedelics	**2**	**2**	**-**	**-**	**-**
	Practical session Assay of Diuretics (Theophylline – Aminophylline-Bumetanide)	**2**	**-**	**1**	**-**	**-**
10	**Lecture** Diuretics **Formative assessment (quiz 2)**	**2**	**2**	**-**	**-**	**-**
	Practical session - Applications -Glutethimide -Chlorpromazine -Imipramine -Nifedipine - Orientation on Activity	**2**	**-**	**1**	**-***	**-**
11	**Lecture** CVS drugs Antihypertensive agents	**2**	**2**	**-**	**-**	**-**
	Practical exam	**2**	**-**	**1**	**-**	**-**
12	**Lecture** Antianginal agents & antiarrhythmic agents. **Formative assessment (quiz 3)**	**2**	**2**	**-**	**-**	**-**
	Practical exam	**2**	**-**	**1**	**-**	**-**
13	**Lecture** Anticoagulants & antihyperlipidemic agents	**2**	**2**	**-**	**-**	**-**
	Practical session Discussion and Assessment of	**2**	**-**	**1**	**-***	**-**

	activity					
14	**Lecture** Revision	**2**	**2**	**-**	**-**	**-**
	Practical session Discussion and Assessment of activity	**2**	**-**	**1**	**-***	**-**
15	**Final written exam**					

***** As part of a self-learning activity in medicinal chemistry II course, a part of practical session in week 10 was specified for the explanation of activity guidelines, rules and assessment rubric. Also, practical sessions in weeks 13 and 14 were facilitated for students to present their reports on the various activity self-learning topics according to the announced student distribution on topics. Supervisors engaged students in a discussion to evaluate the key skills acquired, findings, and conclusions they reached. The activity was formally evaluated against a set of established criteria to ensure a rigorous and consistent assessment.

6-Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (**Mid-term Exam**)	Week 8	10	10%
2	Exam 2 ..... (Semester work)	-	-	-
3	Final Written Exam	Week 15	50	50%
4	Final **Practical**/Clinical/… Exam	Weeks 11 and 12	25	25%
5	Final Oral Exam	Week 15	10	10%
6	Project (**Self-learning Activity**)	Weeks 10,13,14	5	5%
7	Assignment (**Formative assessment**)	Weeks 4,10,12	-	-
8	Other (Mention)	-	-	-

7-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)	Student book and practical notes of "Medicinal chemistry II" approved by the analytical chemistry department 2025-2026.
	Other References	1. G. L. Patrick, An introduction to medicinal chemistry, Seventh Edition ed. Oxford university press, 2023. 2. D. A. Williams, W. O. Foye, and T. L. Lemke, Foye's principles of medicinal chemistry, 8th edition ed. Lippincott Williams & Wilkins, 2019 3. C. O. Wilson, O. Gisvold, J. N. Delgado, and W. A. Remers, Wilson and Gisvold's textbook of organic medicinal and pharmaceutical chemistry, 12th edition, Lippincott-Raven, 2011. 4. D. J. Abraham (Ed.), Burger's medicinal chemistry, drug discovery, and development, 8th Edition, 8-Volume Set, Wiley, 2021. 5. M. J. O'Neil, The Merck index: an encyclopedia of chemicals, drugs, and biologicals, 15th Edition, RSC Publishing, 2013. 6. RSC Publishing, The Merck Index Online, Royal Society of Chemistry, continuously updated, available at: https://merckindex.rsc.org
	Electronic Sources (Links must be added)	http://www.ncbi.nlm.nih.gov/sites/entrez http://www.ekb.eg/web http://journals.tubitak.gov.tr/chem/index.php http://www.pharmacopoeia.co.uk/ www.Pubmed.Com www.sciencedirect.com
	Learning Platforms (Links must be added) **Electronic platform of the Faculty of Pharmacy-Zagazig University for students**	https://phstudent.eps.zu.edu.eg/Views/StudentViews/StudentLogin ?fbclid=IwY2xjawL6FF1leHRuA2FlbQIxMABicmlkETE4NnETkJETktxTE52Rm9nAR6zscxpvbG66rStVoyb6l8uGS6Z03ZEIUMZ6Y__tuPx3ubMLmazZAG0U8NQ_aem_gV2eGYHV6FitgTMHUgIlA
	Other (to be mentioned)	-

Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Computer, board
	Supplies	Chemicals and Glassware
	Electronic Programs	1. Microsoft Office 2. Microsoft Teams
	Skill Labs/ Simulators	-
	Virtual Labs	-
	Other (to be mentioned)	-

Name and Signature **Course Coordinator**	**Name and Signature** **Head of Department**
Prof. Mohammed El-Husseini El-sadek	**Prof. Dr. Hend Kothayer**

COURSE SPECIFICATIONS

Phytochemistry II

Third year – semester 6
2025-2026

Course Specification

(2025-2026)

1. Basic Information

Course Title (according to the bylaw)	Phytochemistry II			
Course Code (according to the bylaw)	PG605			
Department/s participating in delivery of the course	Pharmacognosy			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2 hrs/week	1 hrs/week	-	3 hrs/week
Course Type	Faculty Requirements			
Academic level at which the course is taught	Level 3- semester 6			
Academic Program	Bachelor of Pharmacy (Pharm D)			
Faculty/Institute	Faculty of pharmacy			
University/Academy	Zagazig university			
Name of Course Coordinator	Prof. Dr. Azza El-Shafae			
Course Specification Approval Date	18/8/2025			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department Council			

2. Course Overview (Brief summary of scientific content)

On completion of the course, the student will be able to:

Demonstrate the knowledge and experience that enables to understand, describe, and deal with the chemistry of alkaloids, tannins and antioxidants of plant, fungi or animal origin as well as techniques for their isolation, identification and determination in their respective sources. Finally, the course focuses on the structure activity relationships (SAR) of these natural products derived compounds and their pharmacophoric features. 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**
1.1.1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	**1.C1.2.1.**	Define chromatography and identify different types
		1.C1.2.2.	Define, state and classify certain classes of natural products (alkaloids, tannins and natural antioxidants) and their physical properties.
		1.C1.2.3.	Describe the chemistry of the above-mentioned classes, their pharmacological properties (biological activities) and contra-indications.
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.C.9.1**	Identify different analytical techniques used in natural products determination for the above-mentioned classes, their methods of isolation, purification and identification and applications of chromatographic separation in the field of natural 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**
		1.C1.9.2	Identify natural and pharmaceutical products containing alkaloids, tannins and natural antioxidants.
2.2.1	Isolate, design, identify, synthesize, purify, analyze, and standardize synthetic/ natural pharmaceutical materials.	**2.C2.1.1.**	Practice design, identification, synthesis, purification, isolation, analysis and standardization of synthetic and natural pharmaceutical
		2.C2.1.2.	Predict the appropriate method for isolation, purification and Handle microscope efficiently and design protocols to examine medicinal plants
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.C2.5.1**	Select the appropriate methods for synthesis and analysis of different pharmaceuticals and identification of different alkaloids, tannins and natural antioxidants.
2.3.1	Handle, identify, and dispose biologicals, synthetic/natural materials, biotechnology-based and radio-labeled products, and other materials/products used in the pharmaceutical field.	**2.C3.1.1**	Handle basic laboratory equipment and chemicals effectively and safely.
4-1-1	Demonstrate responsibility for team performance and peer evaluation of other team members, and express time management skills.	**4.C1.3.1**	Work effectively as part of a team by managing time and planning tasks effectively
4-2-2	Use contemporary technologies and media to demonstrate effective presentation skills.	**4.C2.3.1**	Implement writing and presentation skills

4. Teaching and Learning Methods

1. Lectures (data show, board)
2. Practical sessions
3. Self- learning (Activity)
4. Co-operative learning
5. Field visits

5. 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	**Lecture** - Alkaloids Classification, isolation, properties, and biosynthesis	**2**	**2**	**-**	**-**	**-**
	Practical session -General alkaloids chemical tests and isolation.	**2**	**-**	**1**	**-**	**-**
2	**Lecture** Alkaloids Non-heterocyclic	**2**	**2**	**-**	**-**	**-**
	Practical session Chemical tests for ephedrine, caffeine, and brucine.	**2**	**-**	**1**	**-**	**-**
3	**Lecture** Alkaloids Pyridine, piperidine and tropane alkaloids	**2**	**2**	**-**	**-**	**-**
	Practical session Activity: Get a copy of pamphlets for pharmaceutical products containing alkaloids and prepare an oral presentation about it. -Chemical tests for papaverine and quinine	**2**	**-**	**1**	**-**	**-**
4	**Lecture** Alkaloids Xanthine and Imidazole Alkaloids **Formative assessment (quiz1)**	**2**	**2**	**-**	**-**	**-**
	Practical session -Activity: Get a copy of pamphlets for pharmaceutical products containing alkaloids and prepare an oral presentation about it.	**2**	**-**	**1**	**-**	**-**
5	**Lecture** - Alkaloids Quinoline and isoquinoline alkaloids	**2**	**2**	**-**	**-**	**-**
	Practical session Chemical tests for strychnine and atropine.	**2**	**-**	**1**	**-**	**-**

6	**Lecture** Alkaloids Indolic and terpenoid alkaloids	**2**	**2**	**-**	**-**	**-**
	Practical session -Chemical tests for tannins	**2**	**-**	**1**	**-**	**-**
7	**Lecture** Tannins	**2**	**2**	**-**	**-**	**-**
	Practical session -Activity: Get a copy of pamphlets for pharmaceutical products containing tannins and natural antioxidants and prepare an oral presentation about it.	**2**	**-**	**1**	**-**	**-**
8	**Midterm exam**					
9	**Lecture** Natural antioxidants	**2**	**2**	**-**	**-**	**-**
	Practical session Methods of plant analysis	**2**	**-**	**1**	**-**	**-**
10	**Lecture** Introduction to chromatography and extraction methods **Formative assessment (quiz 2)**	**2**	**2**	**-**	**-**	**-**
	Practical session -Column chromatography	**2**	**-**	**1**	**-***	**-**
11	**Lecture** - Column chromatography	**2**	**2**	**-**	**-**	**-**
	Thin layer chromatography and paper chromatography	**2**	**-**	**1**	**-**	**-**
12	**Lecture** Thin layer chromatography **Formative assessment (quiz 3)**	**2**	**2**	**-**	**-**	**-**
	Practical exam	**2**	**-**	**1**	**-**	**-**
13	**Lecture** - Paper chromatography	**2**	**2**	**-**	**-**	**-**
	Practical session Practical Exam	**2**	**-**	**1**	**-***	**-**

14	**Lecture** General discussion and revision	**2**	**2**	**-**	**-**	**-**
	Practical session Discussion and Assessment of activity	**2**	**-**	**1**	**-***	**-**
15	**Final written exam**					

***** As part of a self-learning activity in pharmaceutical analytical chemistry II course, a part of practical session in week 10 was specified for the explanation of activity guidelines, rules and assessment rubric. Also, practical sessions in weeks 13 and 14 were facilitated for students to present their reports on the various activity self-learning topics according to the announced student distribution on topics. Supervisors engaged students in a discussion to evaluate the key skills acquired, findings, and conclusions they reached. The activity was formally evaluated against a set of established criteria to ensure a rigorous and consistent assessment.

6-Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (**Mid-term Exam**)	Week 8	10	10%
2	Exam 2 ..... (Semester work)	-	-	-
3	Final Written Exam	Week 15	50	50%
4	Final **Practical**/Clinical/… Exam	Weeks 12 and 13	25	25%
5	Final Oral Exam	Week 15	10	10%
6	Project (**Self-learning Activity**)	Weeks 3,4,7	5	5%
7	Assignment (**Formative assessment**)	Weeks 4,10,12	-	-
8	Other (Mention)	-	-	-

7-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)	Student book and practical notes of "Phytochemistry II" approved by the analytical chemistry department 2025-2026.
	Other References	1.-Nakanishi, K., Goto, T., & Itô, S. (Eds.). (2013). Natural products chemistry (Vol. 1). Academic press. 2.-Egbuna, C., Kumar, S., Ifemeje, J. C., &Kurhekar, J. V. (Eds.). (2018). Phytochemistry: Volume 2: Pharmacognosy, Nanomedicine, and Contemporary Issues. CRC Press. 3.- Islam, Shahid Ul, and Javid Ahmad Banday, eds. Chemistry of Biologically Potent Natural Products and Synthetic Compounds. John Wiley & Sons, 2021. **4.**-Srivastava, Nishi, Arti Singh, Puja Kumari, Jay Hind Nishad, Veer Singh Gautam, Monika Yadav, Rajnish Bharti, Dharmendra Kumar, and Ravindra N. Kharwar. "Advances in extraction technologies: Isolation and purification of bioactive compounds from biological materials." In Natural bioactive compounds, pp. 409-433. Academic Press, 2021
	Electronic Sources (Links must be added)	http://www.elsevier.com/phytochem http://www.elsevier.com/phytomed http://www.wiley.co.uk. http:// www.sciencedirect.com
	Learning Platforms (Links must be added) **Electronic platform of Faculty of Pharmacy- Zagaig University for students**	
	Other (to be mentioned)	-
Supportive facilities & equipment	**Devices/Instruments**	Computer, board, Conductometer
	Supplies	Chemicals and Glassware

for teaching and learning *	**Electronic Programs**	1. Microsoft office 2. Microsoft teams
	Skill Labs/ Simulators	-
	Virtual Labs	-
	Other (to be mentioned)	-

Name and Signature **Course Coordinator**	**Name and Signature** **Acting Head of Department**
Prof. Dr. Azza El-Shafae.	Prof. Dr. Amal Amin El-Gendy

COURSE SPECIFICATIONS

Biopharmaceutics and Pharmacokinetics

Third year – semester 6
2025-2026

Course Specification

(2025)

1. Basic Information

Course Title (according to the bylaw)	**Biopharmaceutics and Pharmacokinetics**			
Course Code (according to the bylaw)	PT 607			
Department/s participating in delivery of the course	Pharmaceutics Department			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2hrs/week	1 hr/week	-	3hrs/week
Course Type	**Faculty requirement**			
Academic level at which the course is taught	level Three / semester 6			
Academic Program	Bachelor of pharmacy (Pharm D)			
Faculty/Institute	**faculty of pharmacy**			
University/Academy	**Zagazig University/**			
Name of Course Coordinator	**Prof. Dr. Fahkr eldin Ghazy**			
Course Specification Approval Date	**18/8/2025**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Department council**			

2. Course Overview (Brief summary of scientific content)

This course aims to provide students with an understanding of the relation between the physicochemical properties of the drug and its fate in the body. The course explores the principles of biopharmaceutics and strategies for enhancing drug delivery and bioavailability. Integration of knowledge gained from other courses is emphasized to design and assure the quality of drug products. Students will also be introduced to the principles of pharmacokinetics (absorption, distribution, metabolism, elimination). The concepts of bioequivalence, biowaivers and *in-vitro in-vivo* correlation (IVIVC's) will be discussed along with different models of drug disposition. The course prepares students for their evolving role in utilizing pharmacokinetics to guide formulation, dosage-regimen design and optimizing drug usage.

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**
1-1-1	Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	1.C1.2.1	Outline the principles of Biopharmaceutics and pharmacokinetic parameters; bioavailability and bioequivalence and dosage regimen.
		1.C1.8.1	**Apply pharmaceutical and medical terms related to the biopharmaceutics and pharmacokinetics and abbreviations and symbols in pharmacokinetics.**
2-2-4	Adopt the principles of pharmaceutical calculations, biostatistical analysis,	2.C6.1.1	**Apply the equations of different orders of kinetics and compartments, bioavailability, oral dosage regimen and steady state of blood**

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**
	bioinformatics, pharmacokinetic s, and bio-pharmaceutics and their applications in new drug delivery systems, dose modification, bioequivalence studies, and pharmacy practice		**concentration of drugs.**
4-1-2	Retrieve and critically analyze information, identify and solve problems, and work autonomously and effectively in a team	4.C1.5.1	Improve the skills of problem solving.

4. Teaching and Learning Methods

a. Lectures

b. Practical session (problem solving)

c. Self-learning: activity as report preparation about pharmacokinetics of certain drugs

5. 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	**Lecture : Pharmacokinetics** Introduction -Methods of measurement and study approaches -plasma level time curve -Types of pharmacokinetics models	**2**	**2**	**-**	**-**	**-**
	Practical : Problem solving on zero order and first order	**2**	**-**	**1**	**-**	**-**
2	**One compartmental model:** -Assumptions of One compartmental model, -linear and non-linear pharmacokinetics, -One compartment PK parameters	**2**	**2**	**-**	**-**	**-**
	Problem solving on IV bolus one compartmental model (part 1)	**2**	**-**	**1**	**-**	**-**
3	**Multi-compartmental model:** 1- IV bolus two compartmental model; 2- Oral administration two compartmental model; 3- Three compartmental model; -Basics for determination of number of compartments.	**2**	**2**	**-**	**-**	**-**
	IV bolus one compartmental model (part 2)	**2**	**-**	**1**	**-**	**-**
4	**Drug kinetics following single oral drug administration.** - Plasma concentration-time profile after a single oral dose, PK parameters after a single oral dose **Formative assessment (quiz 1)**	**2**	**2**	**-**	**-**	**-**

	Problem solving on Drug pharmacokinetics following single oral dose (part 1))	**2**	-	**1**	-	-
5	**Bioavailability and Bioequivalence:** - Bioequivalence study design. Criteria for waiving bioavailability requirements	**2**	**2**	-	-	-
	Problem solving on Drug pharmacokinetics following single oral dose (part 2)	**2**	-	**1**	-	-
6	**Steady state principle and drug kinetics after IV infusion** **Steady state after multiple drug administration Dosage regimen design**	**2**	**2**	-	-	-
	Problem solving on Bioavailability and bioequivalence (part 1)	**2**	-	**1**	-	-
7	**Mid term exam**					
8	Drugs Absorption - Passive Diffusion - Active Diffusion Specialized transport of drugs	**2**	**2**	-	-	-
	Problem solving on Bioavailability and bioequivalence (part 2)	**2**	-	**1**	-	-
9	Factors affecting drug absorption	**2**	**2**	-	-	-
	Problem solving on Steady state principle after constant IV infusion (part 1)	**2**	-	**1**	-	-
10	Distribution of drugs	**2**	**2**	-	-	-
	Problem solving on Steady state principle after constant IV infusion (part 2) **Formative assessment (quiz 2)**	**2**	-	**1**	-	-
11	Drugs Metabolism	**2**	**2**	-	-	-
	Revision	**2**	-	**1**	-	-
12	Factors affecting biotransformation	**2**	**2**	-	-	-
	Practical exam	**2**	-	**1**	-	-
13	Drug excretion	**2**	**2**	-	-	-
	Activity	**2**	-	**1**	-	-

14	Revision and open discussion	2	2	-	-	-
	Discussion on activity	2	-	1	-	-
15	**Final exam**					

6--Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
١	Exam 1written (mid term exam)	**Week 7**	**10**	**10%**
٢	Exam 2 ..... (Semester work)			
٣	Final Written Exam	**Week 15**	**50**	**50%**
	Final Practical Exam	**Week 12**	**25**	**25%**
	Final Oral Exam	**Week 15**	**10**	**10%**
	Project (self learning) /Portfolio/ Logbook	**Week13, 14**	**5**	**5%**
	Assignments (formativa assessment quiz)	**Week 4, week 10**	**-**	**-**
	Other (Mention)			

*** The methods mentioned are examples, the organization may add and/or delete**

7-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)	**Student book of Biopharmaceutics and pharmacokinetics approved by pharmaceutics department 2025-2026**
	Other References	**Winter's Basic Clinical Pharmacokinetics. Edition: 7Paul Beringer PharmD ISBN/ISSN:9781975195243 Publication Date: January 2, 2024.** **Rowland M. & Tozer T.N.: Clinical Pharmacokinetics Concepts and Applications 5th ed. Hartmut Derendorf Ph.D., Stephan Schmidt Ph.D ISBN/ISSN: 9781496385048 Publication Date: August 8, 2019** **Milo Gibaldi: Biopharmaceutics and Clinical Pharmacokinetics, 4th ed. Lea & Febiger, Philadelphia 2023** **Yu: Andrew and Shargel Leon Biopharmaceutics& Applied Pharmacokinetics, 5th Edition, Applenton&**

		Lange, 2016
	Electronic Sources (Links must be added)	**www.speciation.net**
	Learning Platforms (Links must be added)	
	Other (to be mentioned)	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	**Black (white) boards, data show, computers**
	Supplies	
	Electronic Programs	**Microsoft office** **Microsoft teams**
	Skill Labs/ Simulators	**-**
	Virtual Labs	**-**
	Other (to be mentioned)	**-**

*** The list mentioned is an example, the institution may add and/or delete depending on the nature of the course**

Name and Signature
Course Coordinator
Prof. Dr. Fahkr eldin Ghazy

Name and Signature
Head of Department
Prof. Shereen A. Sabry