

Course Description Form

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| 1. Course Name: |
| Pharmacognosy III (Theoretical+ Practical) |
| 2. Course Code: |
| Phcog26-3210-- |
| 3. Semester / Year: |
| 2 nd Semester/3 rd year |
| 4. Description Preparation Date: |
| 01/09/2025 |
| 5. Available Attendance Forms: |
| Students' signature on attendance sheet |
| 6. Number of Credit Hours (Total) / Number of Units (Total) |
| 2 hours Theoretical + 2 hours Practical (30) /3 units |
| 7. Course administrator's name |
| Theoretical |
| Name: Assist. Prof. Dr. Mohannad Emad Email: mohannad.qazzaz@uomosul.edu.iq Assist. Prof. Dr. Zainab Haitham Email: zainabh@uomosul.edu.iq Assist. Prof. Dr. Khadeja Younus Email: khadejaalabidalwaahed@uomosul.edu.iq |
| Practical |
| Lecturer: Dr. Ban Ali Email: ban-alnuaimy67@uomosul.edu.iq Assist. Lecturer: Zena Sideeq Email: zena.sideeq@uomosul.edu.iq Assist. Lecturer: Samara Sameer Email: samara.sameer@uomosul.edu.iq Assist. Lecturer: Sura Maan Salim Email: sura.maan@uomosul.edu.iq Pharmacist: Mayada Muhammed Email: Mayadamohammed@unmoussl.edu.iq |
| 8. Course Objectives |
| Alkaloids: General Concepts <ul style="list-style-type: none">• Definition of alkaloids and their chemical and pharmacological classification.• Identification of their plant and animal sources.• Understanding their therapeutic importance and toxicity. |
| Ornithine-derived Alkaloids <ul style="list-style-type: none">• Explanation of the biosynthetic pathway of these compounds.• Differentiation of the main tropane alkaloids (e.g., atropine and scopolamine).• Clarification of their medical and pharmaceutical applications. |
| Isolation of Alkaloids from <i>Peganum harmala</i> <ul style="list-style-type: none">• Practical training on extraction methods of alkaloids from plants. |

- Identification of purification techniques using solvents.
- Understanding the therapeutic applications and toxicity of harmala alkaloids.

Pyrrrolizidine Alkaloids (derived from Lysine)

- Identification of chemical structures and toxicity of this class.
- Study of the main plants containing these compounds.
- Understanding their hepatotoxic risks and clinical significance.

Preparation of Khellin

- Learning the steps of laboratory preparation of a natural compound.
- Understanding the relationship between chemical structure and pharmacological activity.
- Recognizing the importance of khellin compounds in treating cardiovascular and respiratory diseases.

Protoalkaloids (derived from Phenylalanine, Tyrosine, and Dopamine)

- Explanation of the biosynthetic pathway of these compounds.
- Study of important examples such as ephedrine and morphine.
- Understanding their medical uses and physiological effects.

Flavonoids in *Ruta graveolens*

- Identification of flavonoid types in the plant.
- Explanation of their antioxidant and anti-inflammatory properties.
- Understanding methods of isolation and determination of flavonoids.

Benzylisoquinoline and Tetrahydroisoquinoline Derivatives

- Study of chemical structures and biosynthetic pathways.
- Understanding the relationship between structure and pharmacological activity.
- Identification of major pharmaceutical examples such as papaverine.

Extraction of Hesperidin

- Practical training on the extraction of a flavonoid compound.
- Identification of the nutritional and pharmaceutical applications of hesperidin.
- Understanding its role as an antioxidant and a capillary protector.

Monoterpenoid Alkaloids and Glycosides

- Identification of the nature and chemical structure of these compounds.
- Study of their pharmacological properties.
- Differentiation between them and other types of alkaloids.

Isolation of Pectin

- Training on the extraction of pectin from plant sources.
- Understanding its role as a pharmaceutical preparation and food additive.

- Identification of its applications in the pharmaceutical industry.

Amaryllidaceae Alkaloids

- Study of prominent examples such as galanthamine.
- Identification of their applications in the treatment of neurological diseases.
- Understanding the medicinal value of plants belonging to this family.

Extraction of Citric Acid from Lemon Juice

- Practical application of organic acid extraction from plants.
- Identification of the uses of citric acid in food and medicine.
- Understanding its properties as an antioxidant and preservative.

Phenethylisoquinoline Alkaloids

- Identification of their chemical structure and biosynthetic pathways.
- Understanding their pharmacological significance.
- Study of practical examples from pharmaceutical drugs.

9. Teaching and Learning Strategies

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| Strategy | Lecturing Seminars Homework Quiz Practical laboratory demonstrations and extraction techniques. |
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10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|------|-------|--|---|--|-------------------|
| 1 | 2+2 | A1 The student defines alkaloids, explains their general concept, and describes their pharmacological importance. A2 The student explains the biosynthetic pathways of ornithine-derived alkaloids. | Alkaloids; Introduction; Ornithine-derived alkaloids, Tropane alkaloids. Isolation of Peganum harmala alkaloids. | Theoretical lectures Laboratory experiments | Paper-based exams |
| 2 | 2+2 | B1 The student compares ornithine-derived and lysine-derived alkaloids in terms of structure and | Pyrrolizidine alkaloids, Lysine-derived alkaloids. Preparation of Khellin. | Theoretical lectures Laboratory demonstration | Paper-based exams |

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| | | activity. B2 The student analyzes the relationship between chemical structure and toxicity in pyrrolizidine alkaloids. | | | |
| 3 | 2+2 | A1 The student defines alkaloids derived from phenylalanine, tyrosine, and dihydroxyphenylalanine (DOPA). A2 The student describes the biosynthetic pathways of protoalkaloids and identifies their main examples. | Phenylalanine-, tyrosine- and dihydroxyphenylalanine-derived alkaloids, Protoalkaloids. Flavonoids of <i>Ruta graveolens</i> . | Theoretical lectures Laboratory demonstration | Paper-based exams |
| 4 | 2+2 | B1 The student compares different types of isoquinoline alkaloids derived from amino acids. B2 The student analyzes the relationship between chemical structure and pharmacological activity of isoquinoline derivatives. B3 The student explains the therapeutic importance of hesperidin as an antioxidant and capillary protector. | Benzylisoquinoline derivatives, Tetrahydroisoquinoline. Extraction of hesperidin. | Theoretical lectures Laboratory demonstration | Paper-based exams |
| 5 | 2+2 | B1 The student compares monoterpenoid alkaloids and glycosides in | Monoterpenoid alkaloids and glycosides. Isolation of pectin. | Theoretical lectures Laboratory demonstration | Paper-based exams |

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| | | <p>terms of structure and function.</p> <p>B2 The student analyzes the relationship between the structure of glycosides and their pharmacological properties.</p> | | | |
| 6 | 2+2 | <p>B1 The student compares Amaryllidaceae alkaloids with other alkaloid classes in terms of structure and function.</p> <p>B2 The student analyzes the relationship between the structure of galanthamine and its therapeutic effect in Alzheimer's disease.</p> | <p>Amaryllidaceae alkaloids.</p> <p>Isolation of citric acid from lemon juice.</p> | <p>Theoretical lectures</p> <p>Laboratory experiments</p> | Paper-based exams |
| 7 | 2+2 | <p>C1 The student applies the steps of citric acid extraction from lemon juice using laboratory methods.</p> <p>C2 The student uses chemical analysis techniques to assess the purity of the extracted sample.</p> <p>C3 The student evaluates the efficiency of isolation and extraction and identifies the factors influencing the results.</p> | <p>Phenethylisoquinoline alkaloids.</p> <p>Isolation of citric acid from lemon juice.</p> | <p>Theoretical lectures</p> <p>Laboratory demonstration</p> | Paper-based exams |

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| Mid-term exam | | | | | |
| 9 | 2+2 | <p>A1 The student defines tryptophan-derived alkaloids and explains their chemical structures and biosynthetic pathways.</p> <p>A2 The student describes major pharmaceutical examples of these alkaloids such as indole alkaloids (reserpine, emetine).</p> | Volatile oils | <p>Theoretical lectures</p> <p>Laboratory demonstration</p> | Paper-based exams |
| 10 | 2+2 | <p>A1 The student defines miscellaneous alkaloids and classifies them chemically.</p> <p>A2 The student understands indolizidine alkaloids and their biological properties.</p> <p>A3 The student identifies imidazole alkaloids and their natural sources.</p> | Alkaloids | <p>Theoretical lectures</p> <p>Laboratory demonstration</p> | Paper-based exams |
| 11 | 2+2 | <p>A1 The student defines purine alkaloids and explains their chemical and biological properties.</p> <p>A2 The student identifies reduced pyridine alkaloids and their classification.</p> | Alkaloids | <p>Theoretical lectures</p> <p>Laboratory demonstration</p> | Paper-based exams |
| 12 | 2+2 | <p>C1 The student compares the chemical and biological</p> | Alkaloids | Theoretical lectures | Paper-based exams |

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| | | <p>properties of terpenoid and steroidal alkaloids.</p> <p>C2 The student interprets experimental results of preparation and evaluates the effectiveness of the method used.</p> | | Laboratory demonstration | |
| 13 | 2+2 | <p>C1 The student compares the biological activities of flavonoids and antibiotics.</p> <p>C2 The student interprets isolation and chemical analysis results of flavonoids and evaluates extract purity.</p> <p>D1 The student applies chemical safety regulations when handling biologically active extracts.</p> <p>D2 The student adheres to ethical and safe principles in the use of natural preparations and antimicrobial compounds.</p> | Antibiotics | <p>Theoretical lectures</p> <p>Laboratory demonstration</p> | Paper-based exams |
| 14 | 2+2 | <p>B1 The student is able to isolate pectin from plant sources using appropriate laboratory techniques.</p> <p>B2 The student applies methods for determining pectin purity and analyzes its</p> | Phytotherapy | <p>Theoretical lectures</p> <p>Laboratory demonstration</p> | Paper-based exams |

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| | | <p>physical and chemical properties.</p> <p>C1 The student interprets isolation results and evaluates the efficiency of the method used.</p> <p>C2 The student relates the properties of the extracted pectin to its applications in pharmaceutical and food industries.</p> | | | |
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15 **Students' seminars**

11. Course Evaluation

- 20 M Theoretical assessments;
(paper-based mid-term exam + quiz + attendance + seminar)
- 20 M practical assessment (attendance + quiz + practice)
- 60 M paper-based theoretical final exam

100 M total

12. Learning and Teaching Resources

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| Required textbooks | 1. Robbers JE, Speedie MK, Tylor VE, Pharmacognosy and Pharmacobiotechnology; 2 nd edition 2008. |
| Main references (sources) | 1. Trease and Evans' Pharmacognosy 2. Practical Pharmacognosy techniques and experiment |
| Electronic References, Websites | <ul style="list-style-type: none"> • PubMed (https://pubmed.ncbi.nlm.nih.gov/) • Medscape (https://www.medscape.com/) • UpToDate (https://www.uptodate.com/) |