The Hashemite University

الجامعـــــــــة الهاشميـــــــــــة

Faculty of Pharmaceutical Sciences

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# Syllabus: Pharmacognosy and Phytochemistry (#131703313)
# Summer Semester 2024 /2025

| COURSE INFORMATION | |
|---|---|
| **Course Name:** Practical Pharmacognosy and Phytochemistry<br>**Learning method:** Hybrid learning<br>**Semester:** First<br>**Department:** pharmaceutical chemistry<br>**Faculty:** Pharmaceutical Sciences | **Course Code:** 1317033134<br>**Section:** As per semester<br>**Core Curriculum**: 2019 Study Plan<br>**JNQF Level:** 7 |
| **Day(s) and Time(s):** According to HU courses timetable/semester<br>**Classroom:** As per semester<br>**Date prepared:** January 2020<br>**Date updated:** October 2024 | **Credit Hours:** 1<br>**Prerequisites**: 1317031211 |

## Course Description

Understanding the definition and material of pharmacognosy science and its applications in therapy and pharmacy, acquainting knowledge of natural drug products, their classification, production, evaluation as well as their general chemistry, and understanding the qualitative and quantitative tests used to evaluate plant material in its crude and powdered status according to pharmacopeia and WHO guidelines for plant-based material.

In addition, this practical course intends to acquaint students with the required practical skillsof natural product analysis including herbal sample preparation (drying and grinding), extraction, separation (chromatography; TLC), and characterization. The applications covered include someselected medicinal herbs and their extractives that are rich in various phytochemical groups of primary and secondary metabolism such as sugars, fixed and volatile oils, alkaloids, phenols, terpenoids, etc., particularly covered by the theoretical courses Photochemistry.

## Course Objectives

1. Knowledge and understanding of the science of pharmacognosy and the use of naturalproducts (e.g. medicinal plants and herbs) in pharmacy and therapy.
2. Identify natural products of plant primary metabolism and their applications in therapy,pharmacy and food industry.
3. Get practical skills needed to evaluate macroscopically and microscopically some selectedmedicinal plants, as crude drugs, covered by the theoretical course
4. Generally define and investigate in the different fields and disciplines related to study ofnatural drugs and pharmacognosy science including sample preparation and separation.
5. Define, identify and evaluate natural drugs derived from plant primary metabolism(carbohydrates, lipids, and proteins).
6. To provide the students with the appropriate knowledge and skills of the methods of separationof natural plant constituents.
7. To identify the groups of plant primary and secondary constituents.
8. Qualitative analysis of plant constituents chromatographically and spectroscopically.
9. Constituents and uses of the analyzed plants
10. Acquaint practical knowledge of methods of identification, classification, production,chemical and physical evaluation of natural drug products.

## Intended Learning Outcomes (ILOs)

Successful completion of the course should lead to the following outcomes:

**A. Knowledge and Understanding:**

1. Apply the science of pharmacognosy and the use of natural products (e.g., medicinalplants and herbs) in pharmacy and therapy.
2. Plant primary metabolites as natural products.
3. Basic principles of separation
4. Basic principles of chemical identification
5. Basic principles of chromatography
6. Basic principles of some spectroscopic methods.

**B. Intellectual skills (cognitive and analytical):**

1. Generally, define and investigate in the different fields and disciplines related to study of natural drugs and pharmacognosy science including sample preparation andseparation.
2. Define, identify, and evaluate natural drugs derived from plant primary metabolism (carbohydrates, lipids, and proteins).
3. Theoretical and practical aspects of separation applied to plant drugs
4. Theoretical and practical aspects of identification applied to plant drugs
5. Theoretical and practical aspects of isolation

**C. Subject specific skills**

The student is expected to learn how to conduct chemical reactions within medicinal chemistrycontext this includes:

1. Acquaint practical knowledge of methods of identification, classification, production,chemical and physical evaluation of natural drug products.
2. Identify natural products of plant primary metabolism and their applications intherapy, pharmacy and food industry.
3. Chromatographic analysis of plant drugs using TLC
4. Identification of impurities and degradation products of plant drugs of known andunknown origin based on TLC spot $R_f$ and color comparisons
5. Determination of the purity of plant drugs

**D. Transferable Skills**

1. Work in a team as a workgroup and discuss results with other colleagues.
2. Know how to conduct a literature survey, access specific information about medicinalplants and natural products as well as how to collect data of others' research to preparea group common report.
3. Skill of different chromatographic procedures (PC, TLC
4. Use of different lab equipment

## Reading List / References:
**Supplementary Textbook(s)**

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|---|---|
| **1** | Practical Manual Pharmacognosy (by: Tyler, Brady, and Robbers). 1990. |
| **2** | Trease and Evans' Pharmacognosy (by W.C. Evans). Edition (year): 15th (2000). |
| **3** | Theoretical course (Phytochemical Analysis) material |
| **4** | Plant Drug Analysis-A TLC Atlas (by H. Wagner and S. Baldt) |
| **5** | Pharmacognosy, Phytochemistry, Medicinal Plants (by J. Bruneton |

| | Course Contents | | | | | |
|---|---|---|---|---|---|---|
| **Date** | **Week** | **Credit Hours** | **Exp. No#** | **Topics** | **Teaching Procedure** | **Assessment methods** |
| 6-10/10 | 1 | 3 | **01** | General instruction and safety rules andlaboratory apparatus & Definitions, Plant Tissue and Structure of Microscope | Lecturing discussion Practical work | - Class participation - Laboratory Report Quizzes Lab work evaluation |
| 13-17/10 | 2 | 3 | **02** | Microscopically Identification ofDifferent Starch Types | Lecturing discussion Practical work Recorded video | - Class participation - Laboratory Report Quizzes Lab work evaluation |
| 20-24/10 | 3 | 3 | **03** | Microscopical Identification of Different Roots and Rhizomes | Lecturing discussion Practical work Recorded video | - Class participation - Laboratory Report Quizzes Lab work evaluation |
| 27-31/10 | 4 | 3 | **04** | Microscopical Identification of Different Barks and Woods | Lecturing discussion Practical work Recorded video | - Class participation - Laboratory Report Quizzes Lab work evaluation |
| 27-31/10 | 6 | 3 | **05** | Microscopical Identification of Different Leaves and Herbs | Lecturing discussion Practical work Recorded video | - Class participation - Laboratory Report Quizzes - Lab work evaluation |
| 3-7/11 | 5 | ***Off days 2-6/11/2022 (First exam duration)*** | | | | |
| 10-14/11 | 6 | 3 | **05** | Microscopical Identification of Different Flowers and Fruits | Lecturing discussion Practical work Recorded video | - Class participation - Laboratory Report Quizzes - Lab work evaluation |
| **17-20/11** | **7** | ***Practical mid exam 21-25/11/2022*** | | | | |
| 24-28/11 | 9 | 3 | **07** | Determination of Fixed Oils from British Pharmacopoeia (BP) | Lecturing discussion Practical work Recorded video | - Class participation - Laboratory Report Quizzes Lab work evaluation |
| 1-5/12 | 10 | 3 | **08** | Extraction and Identification of volatile oils by TLC | Lecturing discussion Practical work Recorded video | - Class participation - Laboratory Report Quizzes Lab work evaluation |
| 8-12/12 | 11 | 3 | **09** | Extraction and Identification ofFlavonoids | Lecturing discussion Practical work Recorded video | - Class participation - Laboratory Report Quizzes Lab work evaluation |
| 15-19/12 22-26/12 | 12 13 | 3 | **10** | Extraction and hydrolysis of Trimyristin from Myristica fragrance **(two weeks experiment)** | Lecturing discussion Practical work Recorded video | - Class participation - Laboratory Report Quizzes Lab work evaluation |
| | 14 | ***Theoretical final exam*** | | | | |

| Grade Distribution | | |
|---|---|---|
| **Assessment** | **Grade** | **Date** |
| 1. Quiz | 15% | Weekly |
| 2. Midterm exam | 25% | To be arranged |
| 3. Report | 10% | Weekly |
| 4. Evaluation | 10% | Weekly |
| 5. Final Examination | 40% | To be arranged |

## Important regulations

- On average, students need to spend 3 hrs of study and preparation weekly.
- Excellent attendance is expected. According to the university policy, students who miss more than 15% of the lecture hours with or without excuse will be dismissed from the course
- At the beginning of the lab, be on time and don't leave before the end of the lab session without an accepted excuse
- If you missed a lab session, it is your responsibility to find out about any announcements or assignments you have missed
- For any clarification, please communicate your instructor at his posted office hours or by appointment
- Switch off your mobile or keep it silent throughout the lecture
- Listen well to the lab discussion and avoid side discussions, if you have a question, ask your instructor and not your colleague
- If you have any information, document your reference, if you didn't, then you broke the intellectual property rights law, and the law will be applied.
- Exams are scheduled to be given two times throughout the semester; you are expected to attend all. If not, make-up exams will be offered for valid reasons. It may be different from regular exams in content and format.
- Cheating, academic misconduct, fabrication and plagiarism will not be tolerated, and the university policy will be applied.
- Each student is expected to familiarize himself with **laboratory rules and safety precautions**.

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