The Hashemite University
Faculty of Pharmaceutical Sciences
Department of Pharmaceutical Chemistry

Semester: 1st semester **Year: 2022/2023**

Course Information	
Course Title	**Practical Pharmacognosy and Phytochemistry**
Course Number	**131703314**
Credit Hours	**1**
Prerequisites	**131703313**

Instructor					
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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 skills of natural product analysis including herbal sample preparation (drying and grinding), extraction, separation (chromatography; TLC), and characterization. The applications covered include some selected 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 natural products (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 selected medicinal plants, as crude drugs, covered by the theoretical course
4. Generally define and investigate in the different fields and disciplines related to study of natural drugs and pharmacognosy science including dample 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 separation of 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.

Course Learning Outcomes (CLOs)

A. Knowledge Transfer: Upon completion of the course, the student should be able to:

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

B. Intellectual Skills: When students have completed the programme they will be able to:

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

C. Approach to Practice: When students have completed the programme they will be able to:

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

D. Personal and Professional Development: When students have completed the programme they will be able to:

D-1 Know how to conduct a literature survey, access specific information about medicinal plants and natural products as well as how to collect data of others' research to prepare a group common report.
D-2 Use of videos and animation to effectively understand the concepts.
D-3 The ability to use simple word and IT skills (i.e., data processing, software, internet, and multimedia) and the library to find information.
D-4 The ability to be self-motivated learners and responsive to feedback.
D-5 Work in a team as a work-group and discuss results with other colleagues.

Reading List

1. Textbook:	**Pharmaceutical Pharmacognosy and Phytochemistry Manual**
2. Recommended Books:	**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 Content					
Week	**Credit Hours**	**CLOs**	**Topics**	**Teaching Procedure**	**Assessment methods**
1	**3**	**A B C D**	**General instruction and safety rules And laboratory apparatus.**	**Lecturing**	**Class participation**
2	**3**	**A B C D**	**Definitions, Plant Tissue and Microscope Structure & Use**	**Lecturing Discussion Practical work**	**Class participation Laboratory Report Quizzes Lab work evaluation**
3	**3**	**A B C D**	**Microscopical Identification of Different Starch Types**	**Lecturing Discussion Practical work**	**Class participation Laboratory Report Quizzes Lab work evaluation**
4	**3**	**A B C D**	**Microscopical Identification of Different Roots and Rhizomes**	**Lecturing Discussion Practical work**	**Class participation Laboratory Report Quizzes Lab work evaluation**
6	**3**	**A B C D**	**Microscopical Identification of Different Roots and Rhizomes**	**Lecturing Discussion Practical work**	**Class participation Laboratory Report Quizzes Lab work evaluation**
7	**3**	**A B C D**	**Microscopical Identification of Different Leaves and Herbs**	**Lecturing Discussion Practical work**	**Class participation Laboratory Report Quizzes Lab work evaluation**
9	**3**	**A B C D**	**Determination of Fixed Oils from British Pharmacopoeia (BP)**	**Lecturing Discussion Practical work**	**Class participation Laboratory Report Quizzes Lab work evaluation**
10	**3**	**A B C D**	**Extraction and Identification of volatile oils by TLC**	**Lecturing Discussion Practical work**	**Class participation Laboratory Report Quizzes Lab work evaluation**
11	**3**	**A B C D**	**Extraction and Identification of Flavonoids**	**Lecturing Discussion Practical work**	**Class participation Laboratory Report Quizzes Lab work evaluation**
12	**3**	**A B C D**	**Extraction of Trimyristin from Myristica fragrance**	**Lecturing Discussion Practical work**	**Class participation Laboratory Report Quizzes Lab work evaluation**
13	**3**	**A B C D**	**Quantitative and Qualitative Analysis of Ascorbic Acid**	**Lecturing Discussion Practical work**	**Class participation Laboratory Report Quizzes Lab work evaluation**

Grade Distribution		
Assessment	**Grade**	**Date**
1. Quizzes	15%	• **Quiz 1 _ week 2 (16-20/10):** Exp.1 "Definitions, Plant Tissue and Microscope Structure & Use" **+ prelab on** Exp.2 "Microscopically Identification of Different Starch Types" • **Quiz 2 _ to be determined** **Quiz 3 to be determined** **Quiz 4 to be determined**
2. Reports	15%	Weekly
3. Lab Evaluation (lab performance, readiness, etc)	10%	weekly
4. Mid Exam (Practical)	20%	The 8th week
5. Final Exam (Theoretical)	40%	The 14th week

Student Evaluation (out of 10):

Each student is evaluated weekly based on the following points:

- ***A.*** Attitude, attendance punctuality, and behaviour. **(2 mark)**
- ***B.*** Cooperation with other group members (team work & fair distribution of roles). (**1.5 mark)**
- ***C.*** Adherence to lab requirements (lab-coat, hair, cleaning tools, …) and rules. **(1 mark)**
- ***D.*** Correct equipment use and safe handling of equipment & glassware. **(1.5mark)**
- ***E.*** Procedure: preparation, adherence, comprehension, and time management. **(2 mark)**
- ***F.*** Cleaning up (Tools, Balance, and Counter). **(2 mark)**

Important regulations

- **On average, students need to spend 1 hrs of study and preparation weekly.**
- **Excellent attendence 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 lectures, be on time and don't leave before the end of the lecture without an accepted excuse**
- **If you missed a class, 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 lecture and avoid side discussions, if you have a question, ask your instructor and not your collegue**
- **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**
  - **For more informations, visit the website:**
  - **http://www.plagiarism.org/**

- **Exams are scheduled to be given three times throughout the semester, your 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 diconduct, fabrication and plagiarism will not be tolerated, and the university policy will be applied.**

Last updated on the (10th of October, 2022) by: MS.C. Farah Hudaib