Department of Biology-Biomedical

College of Science

University of Salahaddin

Subject: Medicinal Plants

Course Book: 4th Year/ 2nd Semester

Lecturer's name: Dr. Badr QaderSurchi

Mrs. Sakar Abdulqadr Saheed

Academic Year: 2023/2024

Course Book

1. Course name	**Medicinal Plants**
2. Lecturer in charge	**Dr Badr Qader Surchi** **M. Sakar Abdulqadr Saheed**
3. Department/ College	Department of Biology College of Science
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5. Time (in hours) per week	Theory 2 hrs./week Practical 2 hrs/week
6. Course code	
7. Teacher's academic	Ph.D. – Assistant Professor MSc Assistant lecturer
8. Keywords	Medicinal Plants – Secondary Metabolites– Health disorders - Complementary and Alternative Medicine
9. Teacher's academic profile	**Dr Badr** • Date of Birth: 1 July 1973 • Place of Birth: Erbil • Nationality: Iraqi • Marital status: Married • Sex: Male **Education**: • Completed a B.Sc. in Biology from the College of Science (1997-1998) at the University of Salahaddin in the Kurdistan Region of Iraq. • In 2006, I graduated from the University of Salahaddin, Kurdistan Region, Iraq with an M.Sc in Plant Biology from the Biology Department at the College of Science. • Completed a Ph.D in Medicinal Plant (2018) from Kahramanmaraş Sütçü İmam University (Turkey) within the Bioengineering and Sciences Department at the Natural and Applied Sciences Institute. **M. Sakar Abdulqadr Saheed** In 2005, I obtained my degree from the Department of Biology at Salahaddin University's College of Education Science. In the year 2010, I successfully obtained my M.Sc. degree. My educational background includes a degree in Plant Nutrition. It brings me immense joy to inform you I will assume the role of a lecturer, beginning in 2021.

10. Course overview:

Undergraduate students will gain a comprehensive understanding of studying medicinal plants through the Medicinal Plants course. This course investigates the diverse world of plants with healing properties through integrating botanical science, pharmacology, and traditional knowledge. Students will learn about medicinal plants and their health benefits through lectures, discussions, and practical sessions. The College of Science, University of Salahaddin is offering a course on medicinal plants through the Department of Biology. The goal of this course is to develop an understanding of the role plants play in traditional and alternative medicines around the world. The text explores different aspects of medicinal plants, such as their historical and cultural importance, therapeutic applications, potential risks, psychoactive effects, and impact on alternative and modern medicine. Additionally, it showcases the positive effects of select food plants and examines medicinal plants in Kurdistan. The text ends by discussing the future potential of medicinal plants.

11. The objective of studying Medicinal Plants:

- The undergraduate Medicinal Plants course aims to equip students with a comprehensive understanding of this diverse and interdisciplinary field.
- Understanding the taxonomy, morphology, and anatomy of medicinal plants is crucial for precise identification and classification.
- To provide a general overview of complementary and Alternative Medicine (CAM) therapies.
- To gain an understanding of the therapeutic applications of medicinal plants, it is crucial to explore the bioactive compounds they possess and their pharmacological effects.
- To comprehend and study the historical and current utilization of medicinal plants in various societies, cultivating an understanding of their developing role in healthcare.
- Enhance communication skills by engaging in presentations, discussions, and written assignments on medicinal plants and their applications.

12. Student's obligation

- Don't miss any lectures or teaching halls.
- Monitoring of student engagements and activities will take place.
- Students need to get ready for quizzes during each session.
- Show respect by wearing appropriate clothing.
- It's important to respect your fellow students and their ideas.
- It is important to turn off or put mobile phones in silent mode.
- Conducting the official tests/exams.
- Missing over 5% of the total course hours will cause an initial warning from the department for the student. Students who miss 10% or more will be expelled from the course for the year.
- Produce reports and conduct presentations.

13. Forms of teaching

Teaching undergraduate students effectively involves using a variety of instructional methods to address diverse learning styles and promote engagement. These are common teaching methods that work well for undergraduates:

- The lecture presentation by the lecturer incorporates both brainstorming and group discussion activities.
- Questions specifically for students in a classroom setting.
- Integrating relevant images and educational films.

- Lecture slides will be available in either PowerPoint/PDF format for printing or as a Word document.
- Each week, all students will receive a digital copy of the lecture before the lecture day to get their hard copy. PowerPoint presentations will present all the covered topics.
- In traditional classroom lectures, they present content in a structured way, introducing key concepts, theories, and information.
- Organize small group discussions to foster active participation and critical thinking, allowing students to share ideas, ask questions, and engage in dialogue.
- Enhance theoretical knowledge through interactive workshops that include practical activities, problem-solving exercises, or collaborative projects.
- Laboratory sessions provide students with opportunities to apply theory, experiment, and develop practical skills.
- By examining real-world scenarios or case studies, theoretical knowledge can apply to practical situations, promoting critical thinking and problem-solving abilities.
- Students can learn at their own pace through online learning modules that use multimedia, quizzes, and interactive elements.
- Encourage teamwork, research skills, and the application of knowledge of group projects.
- Encourage student engagement by incorporating role-playing exercises that apply course concepts to real-life scenarios.
- Promote peer-to-peer learning through student-led presentations and discussions on specific topics.
- Guest lectures offer students real-world insights and diverse perspectives by inviting experts or professionals in the field.
- Arrange visits to applicable sites, such as industries, clinics, and natural habitats, in order to provide hands-on experience and foster deeper understanding.
- Authentic problems or scenarios are presented to students in Problem-Based Learning, and they are guided through researching, analyzing, and proposing solutions.
- Implement online forums or discussion platforms to facilitate asynchronous discussions, allowing students to collaborate and communicate beyond the confines of scheduled classes.
- Require students to maintain reflective journals, providing an opportunity to document their thoughts, insights, and personal reflections on the course content and learning experiences.
- Organize Socratic seminars to facilitate thoughtful discussions and encourage critical thinking.
- Have students show their knowledge and communication skills through class presentations for assessment.
- Introduce a flipped classroom model where students review lecture materials on their own before class, and take part in discussions, problem-solving, and interactive activities during class time.
- Foster a sense of social responsibility by incorporating service-learning projects that allow students to apply their knowledge and skills towards addressing community needs.

14. Assessment scheme:

The grade scheme is as follows:

Midterm: 50%

Midterm Theory Exam(s): 15%

Midterm Exam %10

Activities (Quizzes, Seminars, Reports, Assignments) %5

Midterm Practical Exam 35%

Activities (Seminars, Labs, or Fields) %6

Weekly reports (Results, Discussion, References) %8

Quizzes %6

Mid-term exams %15

Final examination (Theory Exam) 50%

Throughout the course, you can engage in quizzes, seminar presentations, daily attendance, active participation, reports, and posters.

Expect the first Midterm exam to be scheduled for the 4th or 5th week.
After the course, final semester exams will take place.

15- Student learning outcome:

- Student Learning Outcomes (SLOs) for a Medicinal Plants course at the undergraduate level can encompass a range of knowledge, skills, and attitudes that students are expected to acquire by the end of the course. Here are potential student learning outcomes for such a course:
- Knowledge Acquisition: Students will demonstrate a comprehensive understanding of the botanical foundations, including taxonomy, morphology, and anatomy of medicinal plants.
- Identification Skills: Students will be able to identify medicinal plants based on their botanical characteristics, both in a laboratory setting and in their natural habitats.
- Pharmacological Understanding: Students will understand the pharmacological principles underlying the therapeutic effects of bioactive compounds in medicinal plants.
- Cultivation and Harvesting: Students will acquire practical skills in the cultivation and sustainable harvesting of medicinal plants, considering environmental factors and ethical considerations.
- Diversity Recognition: Students will recognize and appreciate the global diversity of medicinal plants, understanding their unique properties and traditional uses.
- Traditional vs. Modern Applications: Students will compare the traditional uses of medicinal plants in various cultures with their modern applications in healthcare.
- Regulatory Compliance: Students will demonstrate knowledge of the regulatory frameworks governing the use of medicinal plants and understand quality control measures.
- Case Study Analysis: Students will be able to analyze real-world case studies to evaluate the effectiveness and challenges associated with the use of medicinal plants.
- Ethical Considerations: Students will consider ethical implications related to the commercialization of medicinal plants, respecting cultural sensitivity and environmental impact.
- Interdisciplinary Connections: Students will recognize and articulate the interdisciplinary nature of medicinal plants, integrating knowledge from botany, pharmacology, and cultural studies.
- Critical Thinking and Problem-Solving: Students will demonstrate critical thinking skills by evaluating the potential benefits and risks associated with the use of medicinal plants in different contexts.
- Communication Skills: Students will effectively communicate their understanding of medicinal plants through presentations, discussions, and written assignments.
- Research Proficiency: Students will develop research skills to stay updated on current developments in the field of medicinal plants, critically analyzing scientific literature.
- Professional and Ethical Conduct: Students will exhibit professionalism and ethical responsibility in the study and application of medicinal plants, considering cultural sensitivity and sustainability.
- Practical Application: Students will apply theoretical knowledge by actively participating in hands-on activities, such as herbal medicine preparation and plant identification.
- Collaborative Learning: Students will engage in collaborative learning through group projects, fostering teamwork and collective problem-solving.
- Reflective Practice: Students will reflect on their learning experiences, recognizing the personal and academic growth achieved during the course.

16- Course Reading List and References:

Ben-Erik van Wyk. Medicinal Plants of the World. 2017.
Linda, RN. And Karl L. Larson. Consumer Health and Integrative Medicine. ISBN 9781284144123. Printed in the United States of America, 2020.
Andrew Chevallier. Encyclopaedia of Herbal Medicine. ISBN: 9781465449818. DorlingKindersley, 2016

17. The Theoretical Topics:

W	Theoretical Topics	hours	Date
1	Discussing the importance of the coursebook and plants.	2	
2	Defining medicinal plants and their scope. The utilization of plants in medicine throughout history. The role of medicinal plants in today's healthcare.	2	
3	Plant Primary metabolites The nutritional value of Medicinal Plants	2	
4	Phytochemistry Secondary metabolites in plants Various bioactive compounds, such as alkaloids, flavonoids, and terpenoids. Exploring the relationship between chemical diversity and medicinal properties.		
5	Understanding the modes of action in medicinal plants	2	
	Plant parts used, dosage forms and plant route of administration		
6	Extraction of medicinal plants Classification of extraction methods	2	
8	**1st Midterm Exam**	1	
7	Traditional Medicine and Ethnopharmacology Traditional healing systems Ethnobotanical knowledge and practices Case studies of traditional medicinal plant use	2	
8	Exploring the relationship between herbal medicine and modern pharmacology. The fusion of traditional and modern medicine. Using clinical trials for evidence-based herbal medicine. Exploring the difficulties and prospects of herbal drug development.	2	
9	CAM (Complementary and Alternative Medicine).	2	
10	Exploring the healing properties of medicinal plants for human health disorders 1	2	
11	Treating human health disorders with medicinal plants 2	2	
12	Quality control and regulation. The legalities of using plants for medicinal purposes. Herbal products and the importance of quality control and standardization. Challenges in the herbal industry	2	
13	**2nd Midterm Exam**	1	

18. Practical Topics

W	Practical Topics	hours	Date
1	Introduction to Laboratory Safety and Equipment Laboratory safety protocols Proper use of equipment and tools Introduction to experimental design	2	

2	Field Visits to Medicinal Plant Gardens or Farms Observation of cultivation practices Interaction with professionals in the field Collection of samples for further analysis	2	
3	Botanical Identification of Medicinal Plants Field trip for plant collection Morphological identification of medicinal plant species Use of taxonomic keys		
4	Plant identification Root and Rhizome medicinal plants	2	
5	Plant identification Stem and leaf medicinal plants	2	
6	Plant identification Flower, fruit and seed medicinal plants	2	
7	Microscopy for Medicinal Plant Anatomy Microscopic examination of plant tissues Identification of key anatomical features Correlation of anatomical structures with medicinal properties	2	
8	Extraction Drying, cutting, and powdering process Extraction of bioactive compounds from medicinal plants	1	
9	Phytochemical Analysis I The amount of yield in percentage. Determining the total condensed tannin. Measuring the antioxidant activity.	2	
10	Phytochemical Analysis II Identification by LC-MS/MS using liquid chromatography mass-spectrometry and Chromatography techniques (TLC, HPLC) Gas chromatography mass-spectrometry GC-MS/MS Spectroscopy (UV-Vis, IR) for compound analysis	2	
11	Antimicrobial Activity The first test for antimicrobial and MIC.	2	
12	**Midterm Exam**	2	

19. Examinations:

- Compositional 2. Definitions, 3. True or false type of exams 4. Multiple choices, 5- Fill the blanks,
- Matching between two groups, 7- Select the most appropriate words or statements.
- Why do we study medicinal plants?
- Write the definition only (4) of the following terms or statements:

Astringent Herbs, Nutritive Herbs, Natural products, Antimicrobials, True alkaloids

- What is the difference between Primary Metabolites and Secondary Metabolites
- Count, for example, all plant parts used to treat illnesses.

Compositional questions: In this type of exam, the questions usually start with Explain how, What arethe reasons for…?, Why…?, How….? With their typical answers

Examples should be provided.

Q 1: Fill in the following blanks with scientific words (You can use some of the following words, not all).(50 Marks)

Antimicrobial properties, anti-inflammatory, leaves of young plants. Sclerenchyma cells, hard, flavors and rigid cells and anticancer properties, smells, isoprene, various structures, phloem, properties. plants, animals, and fungi. Carbohydrates, Parenchyma cells, proteins, lipids, enzymes, support, Nucleic Acids, photosynthesis, food storage. Collenchyma cells, Amino Acids, stems and leaves of mature plants, seeds, fruits. Vascular cells. specialized cells transport water and nutrients. Two, xylem. Organic Acids, metabolic process, Nucleotides, Sugars

1- There are various types of plant cell in plants: A- ---------- are the most common type of plant cell. They are found in all parts of the plant and are involved in various functions, including ----------, ----------, and ----------**.** B- ----------are solid and flexible cells that ---------- the plant. They are found in the ---------and ----------. C- ----------are --------- and ---------- that support the plant. They are found in the ------- and --------- of mature plants, as well as in --------- and --------- . D- ----------: are specialized cells that ---------- throughout the plant. There are two main types: -------- and ----------.

2- Islamic Golden Age: During the Islamic Golden Age (----------), scholars in the Islamic world translated and expanded upon the works of ancient ---------- and ----------

3- Medicinal and aromatic plants (MAPs) can be classified some of the most common classification systems include: ----------, ----------, ----------**,** and ----------

4- Photosynthesis is the most important ---------- in plants. It has the process by which plants convert ---------- into ----------stored in glucose and ----------. This process involves the absorption of ---------- and releasing ------

5- Count all primary metabolites found in plants:----------**,** ----------**,** ----------, ----------,----------, ----------, ----------, ----------, ----------

6- Terpenoids are a large and diverse class of natural compounds produced by----------, ---------, and ----------. They are derived from the five-carbon molecule ---------- and can have various ---------- and ----------. Terpenoids handle many of the characteristic ---------- and ----------, ---------- , and ----------.

Q-4: Can you distinguish whether the following statements are true or false?
(10 Marks)

1- Collenchyma cells exist in the stems and leaves of mature plants.

2- The history of medicinal plant usage dates back at least 10,000 years

3- Medicinal plants are only used in traditional medicine and have no place in modern medicine.

4- Natural products are only used for food and medicine.

5- Secondary metabolites in plants include carbohydrates, proteins, and lipids.
6- Terpenoids are derived from the six-carbon molecule isoprene.
7- St. John's Wort is thought to increase serotonin levels in the brain, contributing to its neuroprotective effects.
8- Antioxidants like vitamins C and E found in medicinal plants can protect the skin from the damaging effects of ultraviolet (UV) radiation.
9- Saturated fats are linked to health issues such as heart disease, high cholesterol, obesity, and certain cancers.
10- Foods rich in omega-3 fatty acids, such as salmon, can contribute to acne.

Q : Write ten dosage forms and types of medicinal plant uses.
Q : Why are Medicinal plants very important?
Q: Why are plants very important?

20. Extra notes:

For the practical session, students need to bring their lab coats.
We must have some scientific trips to drug factories/ or drug companies to see the manufacturingprocess and hygienic conditions.
The planned schedule is flexible and may change depending on local circumstances, including unexpected holidays.

21. Peer review

This course book must be reviewed and signed by a peer. The peer approves the contents of your course book by writing a few sentences in this section.

(A peer is a person who has enough knowledge about the subject you are teaching; they must be a professor, assistant professor, lecturer, or an expert in your subject field).