

Azerbaijan Medical University
Teaching methods (Syllabus)
on "Pharmaceutical botany 1"

"Approved"
chief of department of
Pharmacognosy, prof. J.I.Isayev

Signature: _____
Date: 14.09.2021

Course Unit Code:	
Type of Course Unit:	Mandatory
Semester:	I
Number of credits:	3
Mode of Delivery:	Face to Face
Language of Instruction:	Azerbaijani, Russian, English

Instructor (Lecturer):	associate prof. N.H.Mammadova, senior teacher F.A.Gocayeva, assistant V.V.Mammadova, assistant M.B.Zulfugarova,
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Prerequisites:

There is no need to take subjects and courses that need to be taught in advance before taking this subject

Co-requisite:

There is no need to take subjects and courses that need to be taught in parallel with this subject.

Description of the course:

The subject "Pharmaceutical Botany 1" studies some biological regularities of the plant world, morphological and anatomical structures of vegetative and generative organs of plants, which are of great importance in the practical work of pharmacists on working with medicinal plant raw materials. The educational process should be carried out in the form of a combination of lectures and laboratory sessions. The theoretical knowledge gained at lectures on various topics should be consolidated by the skills acquired by students in the course of laboratory work in laboratory classes.

Purpose of course:

The subject "Pharmaceutical Botany 1" is taught to students studying at the Faculty of Pharmacy and plays a basic role in the study of the major subject "Pharmacognosy", which studies medicinal raw materials of natural origin. This subject plays an important role in the training of bachelor's and master's pharmacists with higher education and lays the foundation for relevant knowledge of medicinal plants.

Course conclusions:

During laboratory classes in "Pharmaceutical Botany 1", the anatomy of plants, the structure of plant cells and tissues, as well as the anatomical structure of individual vegetative organs of plants are studied, each of these being taught as a separate section. Knowledge of plant

anatomy is necessary for microscopic analysis in determining the authenticity of medicinal plant materials.

In the course of teaching the subject "Pharmaceutical Botany 1" in the sections of morphology and anatomy of plants, along with the study of the morphological characteristics of individual vegetative and generative organs of plants and their metamorphoses, they study the principles of identifying their various diagnostic features. Working with herbarium materials, students acquire skills in the morphological description of plants. Future pharmacists must know the morphology and anatomy of plants in order to recognize medicinal plants in nature and correctly identify medicinal plant raw materials using macroscopic and microscopic analysis.

As a result of studying the fundamentals of plant physiology, future pharmacists study the existing biological regularities of plants and thereby gain knowledge about physiological processes, which is important when studying the chemical composition and determining the optimal time for harvesting medicinal plant materials.

The study of the subject "Pharmaceutical Botany 1" prepares students for passing the subjects "Pharmaceutical Botany 2" and «Pharmacognosy».

Subject topics:

1. The importance of pharmaceutical botany.
2. The structure of plant cell.
3. The structure of plant tissues.
4. Morphology of vegetative organs.
5. Anatomy of the vegetative organs.
6. The structure of the generative organs.
7. Pollination and fertilization.
8. Plant nutrition.
9. The main physiological processes in plants (photosynthesis, breathing, transpiration).
10. Reproduction, growth and development of plants.

Lecture topics of the course:

№	Hours	Themes
1	2	Introductory lecture. Pharmaceutical botany - as a branch of botany, its importance in pharmaceutical education. Principles of working with sources of scientific literature in the field of pharmaceutical botany.
2	2	The fundamentals of plant cytology. Features of the structure of plant cells. Storage and excretory substances of the cell, their importance in the identification of the medicinal plant raw materials.
3	2	The fundamentals of the plant histology. Types of the plant tissues, their structure, function and location in organs, their importance in the identification of medicinal plant raw materials.
4	2	Morphology of vegetative organs of higher plants. Basic concepts. Morphology, physiology and anatomy of the root. The specificity of the structure of the roots of plants belonging to different taxonomic groups, and its importance for the identification of plants.

5	2	Morphology and physiology of the shoot. Metamorphosis of the shoot. The concept of the stem. The anatomical structure of the stem. The specificity of the structure of the stems of plants belonging to different taxonomic groups, and its importance for the identification of plants.
6	2	Leaf morphology and its importance in plant identification. Leaf metamorphosis. The leaf as organ of photosynthesis, transpiration and gas exchange. Leaf anatomy. The specificity of the structure of the stems of plants belonging to different taxonomic groups, and its importance for the identification of plants.
7	2	Generative organs of plants. Flower morphology. The biological significance of a flower. Flower formula and diagram. Inflorescences. The specificity of the structure of flowers and inflorescences of plants belonging to different taxonomic groups, and its importance for plant identification.
8	2	Pollination. Fertilization. Morphology of fruits and seeds and their importance for plant identification. Reproduction, growth and development of plants.

Topics of the laboratory training on the course:

№	Hours	Themes
1	2	The use of microscopical methods for plant identification. Fundamentals of Botanical Microengineering. Plant cell structure. Osmotic properties of the cell (turgor, plasmolysis and deplasmolysis). Ergastic substances and their importance for pharmacy. Histochemical reactions on sugars, tannins, etc.
2	2	Storage substances: starch, inulin, proteins, fatty oils, color reactions to them. Excretory substances of the cell: various types of crystals of calcium oxalate and calcium carbonate.
3	2	Meristematic tissues. Primary meristems: apical meristems. Secondary meristems: cambium, phellogen. Mechanical tissues: collenchyme, stone cells, bast fibers, libriform. Basic tissues.
4	4	Covering tissues: epidermis, periderm. Excretory (secretory) tissues: glandular hairs, glands, receptacles, resin passages, laticifers, etc. Conductive tissues. Xylem and phloem elements. Collateral, bicollateral, radial and concentric bundles.
5	2	The use of macroscopical methods for plant identification. Morphology of vegetative organs of higher plants. Root and root system. Types of root systems. Metamorphoses of the roots. Shoot and shoot system. Position of shoots in space. Leaf arrangement.
6	4	Leaf morphology. Metamorphoses of leaves. Anatomical structure of the leaf.

7	2	Anatomic structure of the root of monocot plants. Primary structure of the root of dicot plants. Transitional structure of the root of dicot plants (cambium formation). Secondary structure of the root of dicot plants
8	2	The anatomic structure of the stem. Fascicular structure of the stem of the dicot and of monocot plants. Non-fascicular structure of the stem of the dicot plants. Transition of a fascicular structure to the a non-fascicular structure. Non-fascicular structure of the stem of woody plants. Anatomic structure of the arboreal plants. Anatomical structure of the stem of Gymnosperms.
9	2	Aboveground and underground metamorphoses of the shoot. The structure of the rhizome of monocot and dicot plants.
10	2	Quiz 1.
11	2	Morphology of the generative organs of the plant. Flower morphology. Inflorescence.
12	2	Fruit and seed morphology.
13	2	Quiz 2. Conclusion lesson.

Assesment:

The required credits (100 points) in the subject are recruited according to the following rules.

Before the exam - up to 50 points, including:

attendance - up to 10 points

independent work (abstract) up to 10 points

midterm quiz (conducted at the virtual exam center) - up to 20 points

final quiz (at the department) - up to 10 points

On the exam - up to 50 points

The exam is conducted on a test system.

NOTE:

If a student does not score at least 17 points on the exam, the points obtained before the exam are not counted. The points earned during and before the exam are added up and the final total is estimated as follows:

A - «Excellent»	- 91 - 100
B - «Very good»	- 81 - 90
C - «Good».	- 71 - 80
D - «Satisfactory»	- 61 - 70
E - «Sufficient»	- 51 - 60
F - «Fail »	- less than 51

Free works:

Free works is accepted in two ways:

- 2 free work assignments are given during the semester. Completion of each task is evaluated by points. Free work should be in written form, in the form of a word file, the volume of 1-2 pages (font 12).
- Students can also submit free work in the form of PPT. 20-minute presentation on the topic (minimum 20-25 slides).

Completion of the task is estimated at up to 10 points. Plagiarism should not be allowed, as each free work is a collection of individual opinions of the student.

Topics of free work on the course of Pharmaceutical botany 1

1. Medicinal plants and modern medicine
2. Principles of working with sources of scientific literature in the field of medicinal plants. Rules for the search of literary sources and the design of literary data in the report.
3. Plants and humans.
4. Plant cell structure.
5. Prokaryotic and eukaryotic cells.
6. Structural features of animals, plants and fungi cells.
7. Modern concepts of protoplast.
8. Ergastic substances of plant cell and their importance for pharmacy.
9. Cell storage nutrients and their role in plant identification.
10. Cell excretory substances and their role in plant identification.
11. Plastids and their role in the life of plant cells.
12. Plant cell pigments and their importance.
13. Vacuoles and cell juice. The importance of the composition of cell juice for pharmacy.
14. Osmotic properties of the cell.
15. Plant cell wall
16. Biological membranes and their importance in plant physiology.
17. Plant tissue
18. Meristems (meristematic tissues).
19. Covering tissues.
20. Stomatal apparatus, structure, types, functions and its importance in the diagnosis of medicinal plant materials.
21. Trichomes and emergens and their importance in the diagnosis of medicinal plants.
22. Periderm and its importance.
23. Conductive plant tissues.
24. Xylem and its importance.
25. Phloem and its importance.
26. Conductive tissues and their importance in the diagnosis of medicinal plant materials.
27. Mechanical tissues.
28. Collenchyme and sclerenchyme. Their importance in the diagnosis of medicinal plant materials.
29. Basic tissues and their importance for plants.
30. The value of secretory tissues and their elements in the diagnosis of medicinal plant materials.
31. Photosynthesis and its meaning.
32. Respiration and fermentation in plants.
33. Transpiration.
34. Plant nutrition and its significance.
35. The concept of plant organs.
36. Basic concepts of plant morphology. The importance of morphology in the macroscopic diagnostics of plants.
37. Shoot morphology.
38. Morphology of the buds.
39. Leaf arrangement, leaf mosaic.
40. Metamorphoses of the stem.
41. Rhizome (morphological and anatomical features).
42. Anatomical structure of the stem of monocotyledonous plants.

44. Anatomical structure of the stem of dicotyledonous plants.
45. The fascicular structure of the stem.
46. Non-fascicular structure of the stem
47. Types of stem thickening.
48. Features of the anatomical structure of the vegetative organs of gymnosperms.
49. Anatomical structure of the stem of arboreal plants.
50. Anatomical structure of the stem of herbaceous plants.
51. Leaf morphology.
52. Simple leaf morphology.
53. Morphology of a compound leaf.
54. Anatomy of a leaf. Significance in the diagnosis of medicinal plant materials.
55. Metamorphoses of leaves.
56. Root morphology.
57. Root and root system.
58. Epiblema and its meaning.
59. The anatomical structure of the root and its importance in the diagnosis of medicinal plant raw materials.
60. Polycambial (abnormal) thickening of the main axial organs of plants.
61. Specialization and metamorphosis of roots.
62. Generative organs of plants.
63. Flower morphology and significance in the diagnosis of medicinal plant raw materials.
64. Inflorescence morphology and importance in the diagnosis of medicinal plant raw materials.
65. Fruit morphology and importance in the diagnosis of medicinal plant raw materials.
66. Morphology and distribution of seeds. Significance in the diagnosis of medicinal plant materials.
67. Fertilization of plants.
68. Flowering and pollination.
69. Formula and diagram of a flower.
70. Reproduction of plants.
71. Plant growth and development.

DEADLINE FOR FREE WORKS

Independent work must be completed on a date corresponding to the topic in the schedule. The deadline for the submission of independent work is 1 week before the end of classes.

Reception of independent work should be carried out by teachers after school hours! Independent works submitted after the specified deadline will not be accepted regardless of the reason. The results of independent work are recorded in the journal.

Coursework:

Coursework on this subject is not provided.

Practice:

Industrial and educational practice on this subject is not provided for.

Main Recommended Resources:

1. Kərimov Y.B. və başqaları. Botanika praktikumu - Bakı, 2000, 306 s.
2. Manafov Ə.B. və başqaları- Botanika kursu (ümumi biologiyanın əsasları ilə) - Bakı, 1998, 383 s.
3. Ю.Б. Керимов и другие. Практикум по ботанике. Баку, 1999, 238 с.
4. Яковлев Г.П., Челомбитько В.А. Ботаника, СпецЛит, СПХФА, 2003, 647 с.
- 5.Т.М. Gontova and others. Pharmaceutical botany. Ternopil,TSMU,"Ukrmedknyha, 2013, 378 p.

6. Mühazirə materialı

Additional Resources

1. Zaur Hümbətov. Bitki morfologiyası və anatomiyası (ali məktəblər üçün dərslik) - “Apostroff”, Bakı - 2017, 692 s.
2. Жизнь растений (в 6 томах), М., 1974–1982.
3. Qurbanov E. Ali bitkilərin sistematikası, Bakı Universiteti Nəşriyyatı, Bakı, 2009, 420 s.
4. Heber Wilkinson Youngken. - Pharmaceutical botany: a textbook for students of pharmacy and science Nabu Press, 2010, 515 p.