

**2024/2025. ACADEMIC YEAR**

**PROGRAM OF STUDY**

<b>Full (Hungarian) name of the subject: GYÓGYSZERÉSZI NÖVÉNYTAN</b>							
<b>Program:</b> Undivided program (pharmaceutical)							
<b>Schedule:</b> full-time							
<b>Short name of the subject:</b> Botany							
<b>English name of the subject:</b> Pharmaceutical Botany							
<b>German name of the subject:</b> Pharmazeutische Botanik							
<b>Type of registration:</b> <u>obligatory</u> /obligatory elective/elective/criteria requirement							
<b>Neptun code of the subject:</b> GYKNEI091E1A							
<b>Responsible Department:</b> Department of Pharmacognosy							
<b>Responsible tutor</b> Dr. Ágnes Alberti <b>Contact information:</b> - <b>email:</b> alberti.agnes@semmelweis.hu				<b>Title, academic degree:</b> associate professor, Ph.D.			
<b>Name of the persons responsible for the teaching of the subject:</b> Imre Boldizsár Attila Ványolós  Ákos Rácz				<b>Title, academic degree:</b> associate professor, Ph.D. associate professor, Ph.D.  assistant professor, Ph.D.			
<b>Class per week:</b> 2 lectures 2 practices				<b>Credit point(s):</b> 2 credits (lectures) 1 credit (practice)			
<b>Professional content, intent of acquirement and its function in order to implement the goals of the program:</b> The main aims of the subject are as follows: 1) To get familiar with the botanical features of plants at the cytological, histological, and organizational levels in order to gain basic knowledge essential for pharmacopeial drug analysis 2) To obtain a comprehensive picture of general and specific metabolic processes and physiological phenomena of plants to understand the production and accumulation of biologically active substances (and their mode of storage). 3) To study the chemotaxonomy of plants in order to be able to recognize medicinal herbs (and poisonous plants) and to understand their kinship and chemism.							
<b>Short description of the subject:</b>  The subject summarizes current knowledge on the structure and function of plant cells and their participation in biochemical processes. It presents the anatomical (histological) and macroscopic morphological characteristics of the plant organs, that also represent drugs, and their physiological processes, highlighting their role in the production and accumulation of biologically active substances. It describes the systematization of the flora most important from the pharmaceutical point of view: chemotaxonomy with special emphasis on chemism. In this context, it presents important medicinal herbs (and poisonous plants) and their morphological characteristics necessary for their recognition							
<b>Course data</b>							
<b>Recommended term</b>	<b>Contact hours (lecture)</b>	<b>Contact hours (practice)</b>	<b>Contact hours (seminar)</b>	<b>Individual lectures</b>	<b>Total number of contact hours/semester</b>	<b>Normal course offer</b>	<b>Consultations</b>
5th semester	28	-	-	-	28	<u>Autumn semester*</u> Spring semester Both semesters (* Please underline)	--

**Program of semester\*\***

**Topics of theoretical classes (pro week):**

1. week: Introduction to Pharmaceutical Botany. Aims and Scope. Cellular Plant Anatomy. Cell organelles. Cell wall structure. Plant tissues: parenchyma, sclerenchyma, collenchyma
2. week: Vascular Plant tissues: phloem and xylem. Vascular bundles. Epidermis. Stomata. Secretory tissues
3. week: Roots. Root system and morphology
4. week: Stems. Morphology, primary and secondary growth, woody stem
5. week: Leaves: macroscopic and microscopic morphology
6. week: Flowers: parts of a flower, floral types. The main types of inflorescences.
7. week: Development of seeds and fruits, double fertilization. Fruit types. Histological features of seeds and fruits.
8. week: Introduction to taxonomy. Kingdom of fungi: ecology, distribution, importance, Ascomycota, and Basidiomycota.
9. week: Pteridophyta: Filicopsida, Equisetopsida, Lycopodiopsida. Gymnosperms: Conifers, Ginkgo, Gnetales
10. week: Introduction to Angiosperms. Families of Magnoliidae, Caryophyllidae and Hamamelididae subclasses
11. week: Rosidae subclass: Rosaceae, Aerialiaceae, Fabaceae, Apiaceae, Malvaceae
12. week: Dilleniidae subclass: Malvaceae, Salicaceae, Euphorbiaceae, Urticaceae, Cannabaceae, Brassicaceae.
13. week: Lamiidae and Asteridae subclasses: Solanaceae, Boraginaceae, Schrophulariceae, Lamiaceae, Asteraceae.
14. week: Characterization of monocot plants. Alliaceae, Asphodelaceae, Amaryllidaceae, Zingiberaceae, Poaceae

<b>Topics of practical classes (pro week): -</b>	
01	Structure of Flowers 01 General terms and concepts Examples from the families Ranunculaceae, Rosaceae.
02	Structure of Flowers 02 Characteristics of the families Fabaceae, Malvaceae, Lamiaceae.
03	Structure of Flowers 03, Examples of Inflorescences. Characteristics of the families Caryophyllaceae, Solanaceae, Asteraceae (Cichoriaceae).
04	Macroscopic characteristics of seeds and fruits.
05	Study of the plant cell 01 - structure, vacuoles, osmosis, anthocyanins, plastids. Starch types.
06	Study of the plant cell 02 - cell wall manifestations. Crystal types.
07	1st test: Weeks 01 - 06
08	Examination of the dermal tissue - epidermis, stomata, covering and glandular hairs.
09	Ground tissues – parenchyma, sclerenchyma, collenchyma
10	Vascular tissues. Root structure.
11	Construction of the young and old roots.
12	Structure of young and old (single and dicotyledonous) stems, rhizomes
13	Structure of foliage leaves and flower leaves.
14	2nd test: Weeks 08 – 13 Retakes
<b>Schedule of consultations:</b> on demand	
<b>Course requirements</b>	
<b>Prerequisites:</b> Biochemistry II.	
<b>Conditions of attending the classes, amount of acceptable absents, way of presentation of leave, opportunity for makeup:</b> Based on the current Study and Exam regulations	

**The grading method; the conditions for getting the signature; the number, topic(s) and date(s) of the mid-term assessments, (reports, term tests), and the process in which they contribute to the final grade; and the possibility of their retake or their upgrading retake (as provided in §§ 25-28 of the STUDY AND EXAMINATION REGULATIONS):** two midterm tests taken on dates specified in the beginning of the semester, retake possibilities on the week following the midterm, and also on the last week.

**Number, topics, and dates of tests during the semester, opportunities of makeup and improvement of results\*\*\*: -**

**Requirements of signature (as provided for in STUDY AND EXAMINATION REGULATIONS § 29):**

Participation at the practices. Submission and acceptance of reports. The average of the two midterms' grade should be at least 2.00 (Passing grade).

**Number and type of projects students have to perform independently during the semester and their deadlines: -**

**Type of the semester-end examination:** signature\*/practical grade\*/semi-final\*/final\* (\* Please underline)

**Examination requirements:** as published by the education-research department on the MOODLE interface by the start of the academic term.

### *Topic list for oral exam*

#### Topic A

A/1. Characteristics of plant cells. Structure and chemistry of cell walls. Thickening of cell wall in plants. Sclerenchyma

A/2. Plastid types and structure, main steps of photosynthesis. Plant tissues: collenchyma, parenchyma.

A/3. Secretory tissues: types, structure, role in the synthesis of secondary metabolites.

A/4. Epidermis, trichomes, stoma (types and examples). Periderm and rhytidome.

A/5. Roots: types; young/primary roots, secondary growth; specialized roots.

A/6. Stems: young/primary stems. Specialized stem structures.

A/7. Secondary growth of stems. Woody stem, periderm.

A/8. Leaves: macroscopic and microscopic structure.

A/9. Flowers: parts of a flower, floral types. The main types of inflorescences.

A/10. Development of seeds and fruits, double fertilization. Fruit types. Histological features of seeds and fruits.

#### Topic B

B/1. Kingdom of fungi: ecology, distribution, importance, Ascomycota, and Basidiomycota.

B/2. Pteridophyta: general features, Filicopsida, Equisetopsida and Lycopodiopsida.

B/3. Gymnosperms: Conifers, Ginkgo, Gnetales.

B/4. Magnoliidae subclass: Magnoliaceae, Myristicaceae, Lauraceae, Piperaceae, Ranunculaceae, Papaveraceae

B/5. Caryophyllidae subclass: Caryophyllaceae, Cactaceae, Chenopodiaceae, Polygonaceae.

B/6. Hamamelididae subclass: Fagaceae, Betulaceae, Juglandaceae families.

B/7. Rosidae subclass: Crassulaceae, Rosaceae, Mimosaceae, Cesalpiniaceae, Fabaceae.

B/8. Rosidae subclass: Myrtaceae, Rutaceae, Anacardiaceae, Araliaceae, Apiaceae.

B/9. Dilleniidae subclass: Malvaceae, Salicaceae, Euphorbiaceae, Urticaceae, Cannabaceae, Brassicaceae.

B/10. Cornidae subclass: Ericaceae, Rubiaceae, Loganiaceae, Valerianaceae, Apocynaceae.

B/11. Lamiidae and Asteridae subclass: Solanaceae, Boraginaceae, Schrophulariaceae, Lamiaceae, Asteraceae.

B/12. Characterization of monocot plants. Alliaceae, Asphodelaceae, Amaryllidaceae, Zingiberaceae, Poaceae.

**1-1 topic from Topic A and B are chosen by the student. For each topic a sufficient (lowest passing) grade is required. Besides topic A and B, plant recognition test is performed based on the plant photo collection available.**

**Form of the semester-end examination:** written\*/oral\*/combined examination/**practical examination**/the assessment of completing project work (according to STUDY AND EXAMINATION REGULATIONS 30.§)\* (*Please underline*)

**The possibility and conditions for offering grades: -**

**A list of the basic notes, textbooks, resources and literature that can be used to acquire the knowledge necessary to master the curriculum and to complete the assessments, \*\*\*\*-with exact description about which of them is required to acquire which part of the syllabus (e.g. description based on topics)), as well as the main technical and other aids and study aids that can be used:**

**Lectures and practice seminars available for the study of each topic:**

A/1. Characteristics of plant cells. Structure and chemistry of cell walls. Thickening of cell wall in plants. Sclerenchyma (Lectures 1-2, Practice 5-6)

A/2. Plastid types and structure, main steps of photosynthesis. Plant tissues: collenchyma, parenchyma. (Lectures 1-2, Practices 5-6)

A/3. Secretory tissues: types, structure, role in the synthesis of secondary metabolites. (Lectures 1-2, Practice 6-7)

A/4. Epidermis, trichomes, stoma (types and examples). Periderm and rhytidome. (Lectures 2-4, Practices 6-7)

A/5. Roots: types; young/primary roots, secondary growth; specialized roots. (Lecture 3, Practices 10)

A/6. Stems: young/primary stems. Specialized stem structures. (Lecture 3, Practice 10)

A/7. Secondary growth of stems. Woody stem, periderm. (Lecture 4, Practice 11)

A/8. Leaves: macroscopic and microscopic structure. (Lecture 5, Practice 12)

A/9. Flowers: parts of a flower, floral types. The main types of inflorescences. (Lecture 6, Practice 1-3)

A/10. Development of seeds and fruits, double fertilization. Fruit types. Histological features of seeds and fruits. (Lecture 7, Practice 13)

B/1. Kingdom of fungi: ecology, distribution, importance, Ascomycota, and Basidiomycota. (Lecture 8)

B/2. Pteridophyta: general features, Filicopsida, Equisetopsida and Lycopodiopsida. (Lecture 9)

B/3. Gymnosperms: Conifers, Ginkgo, Gnetales. (Lecture 9)

B/4. Magnoliidae subclass: Magnoliaceae, Myristicaceae, Lauraceae, Piperaceae, Ranunculaceae, Papaveraceae (Lecture 10)

B/5. Caryophyllidae subclass: Caryophyllaceae, Cactaceae, Chenopodiaceae, Polygonaceae. (Lecture 10)

B/6. Hamamelididae subclass: Fagaceae, Betulaceae, Juglandaceae families. (Lecture 10)

B/7. Rosidae subclass: Crassulaceae, Rosaceae, Mimosaceae, Cesalpiniaceae, Fabaceae. (Lecture 11)

B/8. Rosidae subclass: Myrtaceae, Rutaceae, Anacardiaceae, Araliaceae, Apiaceae. (Lecture 11)

B/9. Dilleniidae subclass: Malvaceae, Salicaceae, Euphorbiaceae, Urticaceae, Cannabaceae, Brassicaceae. (Lecture 12)

B/10. Cornidae subclass: Ericaceae, Rubiaceae, Loganiaceae, Valerianaceae, Apocynaceae. (Lecture 12)

B/11. Lamiidae and Asteridae subclass: Solanaceae, Boraginaceae, Schrophulariaceae, Lamiaceae, Asteraceae. (Lecture 13)

B/12. Characterization of monocot plants. Alliaceae, Asphodelaceae, Amaryllidaceae, Zingiberaceae, Poaceae. (Lecture 14)

**In the case of a subject lasting more than one semester, the position of the teaching/research department on the possibility of parallel enrolment and the conditions for admission\*\*\*\*:**

yes\*/no\*/on and individual assessment basis\* (\* Please underline)

**The course description was prepared by:** Dr. Attila Ványolós

**\*\* A tantárgy tematikáját oly módon kell meghatározni, hogy az lehetővé tegye más intézményben a kreditismerési döntéshozatalt, tartalmazza a megszerzendő ismeretek, elsajátítandó alkalmazási (rész)kézségek, (rész)kompetenciák és attitűdök leírását, reflektálva a szak képzési és kimeneti követelményeire.**