

Anatomy of medicinal and food plants,

- short, credit bearing course -

General information

Number of ECTS: 4

Language: English

Modality: Blended

Proposed period: Winter Semester 2027 and 2028

Duration: 4 days online and 3 days onsite sessions

Target groups: undergraduate, master and PhD students

Number of Participants: 20

Prerequisites: motivation letter

Lecturers: **Prof Lana Zorić, PhD, full professor, Faculty of Sciences, University of Novi Sad**
Prof. Szilárd Czóbel, PhD, full professor, Faculty of Agriculture, University of Szeged

Course aim

The aim of the course is for students to become familiar with the anatomical structure of plant organs of medicinal and food plants, and to learn the structural basis of their medicinal and nutritional properties. The aim of the practical part of the course is to train students for work in an anatomical laboratory and to provide them with hands-on experience in sectioning and microscopy of plant organs.

Course description

Through a series of online lectures, students will gain fundamental theoretical knowledge of plant anatomy, with a focus on the structural features of medicinal and food plants. Special emphasis will be placed on secretory tissues, which produce medicinally important substances, and parenchyma tissues, which store food and nutrients and photosynthesize. Individual assignments will provide students with the opportunity to apply their theoretical knowledge to problem-based tasks.

Following the theoretical component, students will participate in a two-day on-site workshop. At the Laboratory of Plant Anatomy, Faculty of Sciences, University of Novi Sad, they will gain hands-on experience in plant organ sectioning, microtomy, and light microscopy. This practical training will enhance their understanding of the structural characteristics of medicinal and food plants, while also enhancing their skills in plant anatomy laboratory.

Learning objectives

Learning objectives of this course are:

1. Understanding the structure of vegetative and reproductive plant organs
 - a. Identifying and describing the main tissue types in plant organs.
 - b. Explaining structural differences between different groups of plants
2. Understanding the function of specific plant tissues
3. Applying anatomical knowledge on medicinal and food plants
 - a. Correlating structural characteristics of medicinal plants with their functional properties (e.g., essential oil production, storage tissues).
 - b. Explaining the role of secretory tissues in medicinal plants
 - c. Comparison of anatomical differences between different food and medicinal plants based on their adaptive traits.
4. Applying anatomical knowledge in understanding anatomical adaptations
5. Developing practical skills in plant anatomy
 - a. Developing techniques of sectioning and microtomy
 - b. Developing technique of light microscopy
6. Identification of key anatomical features on cross-sections of medicinal and food plants

Learning outcomes

By the end of this course, students will be able to:

1. Explain and describe the anatomical structure of vegetative and reproductive plant organs.
2. Identify and distinguish different plant tissues (parenchyma, mechanical tissues, dermal tissues, vascular tissues, secretory structures).
3. Compare anatomical features of different medicinal and food plants and relate them to their functions.
4. Analyze and interpret the structural adaptations of plant organs related to their function and medicinal properties.
5. Prepare and process plant samples by making anatomical sections using microtomy techniques.
6. Use light microscopy effectively to observe and document plant anatomical structures.
7. Demonstrate practical skills in anatomical sample preparation and microscopy that are applicable to plant science research or industry.

Course content

Lectures:

- Root anatomy. Anatomy of storage roots and underground metamorphosed shoots of food plants.
- Stem anatomy. Wood anatomy and its relation to tree vigor and fruit tree productivity.
- Leaf anatomy. Anatomy of medicinal plant leaves, including types and distribution of secretory tissues.
- Fruit and seed anatomy of medicinal and food plants.
- Structural adaptations of plant organs in relation to their function and medicinal properties.

Practical work (On-site, Laboratory of Plant Anatomy, Faculty of Sciences, University of Novi Sad):

- Learning techniques of sectioning and microtomy of different plant organs.
- Training in light microscopy techniques.
- Observing and analyzing microscopic sections of various plant organs from medicinal and food plants.
- Identifying different plant tissues and conducting comparative analysis of organ structures.

Student assignments:

- Individual problem-based tasks, applying theoretical knowledge.
- Presentation of findings, group discussion and evaluation of student work.

Course design

The course is designed for students interested in plant science, particularly morphology and anatomy. It comprises theoretical, practical and discussion component, each with distinct pedagogical objectives.

1. Theoretical Component: Delivered through a series of online lectures, this part establishes a foundational understanding of plant anatomy, giving theoretical framework, and explores structural adaptations in food and medicinal plants.
2. Discussion Component: Students will actively engage in discussions through their first assignment and the presentation of their work. Questions and feedback will be encouraged as part of the learning process. Additionally, students will be invited to participate in topic-based discussions during online lectures.
3. Practical Component: Conducted on-site in the Laboratory of Plant Anatomy, Faculty of Sciences, University of Novi Sad. This segment involves hands-on training in sectioning, microtomy, and light microscopy, allowing students to apply their theoretical knowledge in a laboratory setting.
4. Skill Development: Through laboratory work, students will enhance their communication skills, teamwork abilities, and intercultural competence.

5. Learning Resources: Course materials, including presentations, will be made available to all students.
6. Assessment and Supervision: Continuous supervision will be provided for all student assessments to ensure a supportive learning environment.

Assessment and Grades Marking Scale: Fail, Pass.

Student evaluation will be based on two assignments. The first assignment will be a theoretical, problem-based task that students must complete individually. They will submit, present, and defend their work online (grade: pass/fail).

Pass. A result that meets the requirements regarding individual problem-based tasks, a successful and well-structured presentation of the findings, and active participation in group discussions.

Fail: An inadequate result in the individual task or an insufficient presentation of the findings. The student did not engage with the task at all and showed no interest in the discussion.

The second assignment will be conducted during the practical work on-site (grade: pass/fail).

Pass: A result that meets the requirements for successfully producing sections of plant organs and demonstrating the ability to recognize and describe different plant structures using light microscopy.

Fail: An inadequate result in terms of the ability to make sections of plant organs. The student was unable to recognize different plant structures using light microscopy and showed no interest in laboratory work.

Students who successfully complete both assignments will receive a certificate and earn 4 ECTS credits.

Entry requirements

Bachelor level student of the EUGLOH partner universities.

Further Information

Nataša Hrabovski, University of Novi Sad, Serbia (natasa.hrabovski@uns.ac.rs)