NAVOI STATE UNIVERSITY

BOT11210 BOTANY (PLANT ANATOMY & MORPHOLOGY) — COURSE SYLLABUS

Faculty of Natural Sciences & Medicine | Department of Biology | Program: 60510100 Biology

COURSE PASSPORT & ACADEMIC METADATA

Course Title: Botany (Plant Anatomy, Morphology & Cell Biology)
Course Code: BOT11210
Field of Study: 100000 Humanities / Natural Sciences
Program: 60510100 Biology
Academic Year: 2026–2027
Target Audience: 1st Year Students (Kazakh Group Curriculum)
Form: Full-time
Language: Uzbek
Workload Allocation: 300 Hours total (Lectures, Practical/Lab, Independent Study)
Assessment: Examination
Aligned UN SDGs: SDG 15 (Life on Land), SDG 4 (Quality Education)





1. Course Description & SDG Integration

The Botany course provides fundamental theoretical knowledge and practical expertise in plant anatomy, morphology, cellular biology, and tissue differentiation. Students explore structural, functional, and ontogenetic adaptations of vegetative and generative organs.

In alignment with SDG 15 (Life on Land) and SDG 4 (Quality Education), this course fosters scientific competency in biodiversity evaluation, plant tissue microscopy, and ecological adaptation mechanisms essential for conservation and agricultural biology.

2. Course Aims & Learning Outcomes

Course Aim: To develop theoretical mastery and laboratory microscopy skills in identifying plant internal anatomical structures, tissue types, organogenesis, and reproductive biology.

- Knowledge: Understand plant cellular dynamics, primary and secondary anatomical tissue structures (meristem, dermal, vascular, mechanical, ground), root/stem/leaf ontogeny, and seed germination.
- Laboratory Skills: Prepare microtome sections, conduct microscopic slide examinations, draw anatomical diagrams, and analyze organ adaptations under varying environmental conditions.
- Professional Competencies: Apply morphological and anatomical diagnostic keys to classify plant species and evaluate structural adaptations for ecological research.
- SDG Competencies: Contribute to terrestrial ecosystem conservation through advanced botanical diagnostic competencies (SDG 15).

3. Prerequisites

Prerequisites: General Biology (Secondary Education level), Introductory School Botany, General Chemistry.

4. Course Structure & Workload Allocation

Activity Type	Academic Workload Allocation	ECTS & Hours Summary
Lectures	60 Hours	Core Theory
Practical & Laboratory	90 Hours	Hands-on Microscopy
Independent Study	150 Hours	Self-directed Research
Total Workload	300 Hours	10 ECTS Credits

5. Detailed Course Curriculum Outline

5.1 Lecture Syllabus Outline

• **L1: Introduction & Plant Cytology:** Botanical science objectives, history, plant cell ultrastructure, plastids, cell wall dynamics, and ergastic inclusions.

• **L2: Plant Tissues (Histology):** Classification of plant tissues: meristematic, protective (dermal), fundamental (ground), mechanical, and vascular tissues.

• **L3: Vegetative Organ Anatomy - Root:** Primary and secondary anatomical structure of roots, root metamorphosis, and mycorrhizal associations.

• **L4: Vegetative Organ Anatomy - Shoot & Stem:** Stem anatomy in monocots and dicots, vascular bundle organization, cambial activity, and secondary growth.

• **L5: Leaf Anatomy & Ecological Metamorphosis:** Dorsoventral and isobilateral leaf anatomy, stomatal complexes, trichomes, and ecological adaptations (xerophytes, hydrophytes).

• **L6: Generative Organ Morphology - Flower & Inflorescence:** Flower architecture, androecium, microsporogenesis, gynoecium, megasporogenesis, and pollination mechanisms.

• **L7: Embryology, Seed & Fruit Development:** Double fertilization mechanism, seed structure, embryo development, fruit classification, and seed dispersal strategies.

5.2 Practical & Laboratory Outline

- Microscopy techniques: Preparing wet-mount slides, observing plant cells, starch grains, and chromoplasts.
- Histological examination of apical meristems, parenchyma, sclerenchyma, collenchyma, xylem, and phloem.
- Anatomical cross-section analysis of primary and secondary roots in monocotyledons and dicotyledons.
- Anatomical cross-section analysis of herbaceous and woody stems.
- Leaf blade cross-sections: Examining mesophyll structure, stomata, and cuticle thickness.
- Dissection and morphological analysis of flower parts, pollen grain examination, and floral diagrams/formulas.
- Fruit morphology and seed structural examination across diverse angiosperm families.

5.3 Independent Study (Mustaqil Ta'lim) Topics

- Comparative morphological analysis of root, stem, and leaf adaptations across varying ecological niches.
- Microscopic structural analysis comparing monocot and dicot anatomical traits (tables and schematics).
- Plant tissue functional adaptations: Detailed diagrams of protective, mechanical, and conductive systems.
- Preparation of herbarium specimens and anatomical diagnostic logs.

6. Recommended Literature & Information Sources

- Baxramov I.Z., Ravshanova M.X. Systematics of Higher Plants (Laboratory Guide). Tashkent, 2024.
- Pratov O.P., Nabiyev M.M. Modern System of Higher Plants of Uzbekistan. Tashkent: O'qituvchi, 2007.
- Tojiboev Sh.J., Naralieva N.M. Botany (Lower Plants). Namangan, 2016.