NAVOI STATE UNIVERSITY

O'F304 PLANT PHYSIOLOGY — COURSE SYLLABUS

Faculty of Natural Sciences and Medicine | Department of Biology | Biology Teacher Education Programme

COURSE PASSPORT & ACADEMIC METADATA

Course Title:	Course Code:
Plant Physiology	O'F304
Course Type:	**Field of Study:**
Elective Course	100000 Education / 110000 Education & Teaching
Programme:	**Academic Year:**
60110900 Biology	2025–2026
Semester:	**Form of Education:**
6 (VI)	Full-time / Uzbek
ECTS Credits:	**Total Workload:**
4 ECTS Credits	120 Hours (60 Contact Hours [30 Lectures, 30 Practical], 60 Independent Study Hours)
Weekly Contact Hours:	**Assessment:**
4 Hours	Test / Final Examination
Curriculum Code:	**Aligned UN SDGs:**
60110900-2.08	SDG 2 (Zero Hunger); SDG 13 (Climate Action); SDG 15 (Life on Land); SDG 4 (Quality Education)



1. Course Description & Scope

The course 'Plant Physiology' (O'F304) covers the physiological processes of plant organisms, plant cell anatomy and membrane functions, water exchange mechanics (root absorption, sap ascent, transpiration), photosynthetic pathways (chloroplast ultrastructure, light/dark reactions, photophosphorylation), plant respiration mechanisms, mineral nutrition, phytohormone action mechanics, plant movements, growth and development rhythms, and pathological plant physiology (defense mechanisms against viruses, bacteria, fungi, insects, and nematodes) [cite: 109, 110, 111].

2. Course Aims & Professional Competencies

Course Aim: To provide future biology educators and specialists with a thorough understanding of plant cell physiology, internal metabolic functions, growth regulations, and ecological adaptation mechanisms under varying environmental conditions [cite: 109].

Professional Competencies:

• Knowledge: Comprehensive understanding of plant cell structure, plasma membrane transport, water transport, photosynthetic carbon fixation, respiration types, mineral absorption, and hormonal regulation [cite: 109, 110].
• Practical & Pedagogical Skills: Practical execution of physiological experiments (plasmolysis, stomatal movement, transpiration rates, enzyme assays, mineral element identification) and scientific analysis of plant physiological phenomena for secondary and higher education teaching [cite: 110, 111, 112].
• Stress & Pathological Diagnostics: Ability to scientifically evaluate environmental stress factors and pathological symptoms caused by biological agents (viruses, bacteria, fungi, pests) [cite: 110, 111].

3. Prerequisites

• Botany (Plant Anatomy, Morphology, Life Forms, and Systematics — BOT111) [cite: 109]
• Fundamentals of Cytology and General Biology [cite: 109]

4. Course Learning Outcomes (CLO)

Code	Learning Outcome Description
CLO 1	Describe plant cellular mechanics, water potential, root uptake, transpiration, photosynthetic light/dark reactions, and respiratory metabolic pathways [cite: 109, 110, 111].
CLO 2	Conduct standard practical experiments on plant osmotic relations, pigment function, enzyme activity, and mineral element identification [cite: 111, 112].
CLO 3	Analyze plant physiological responses to environmental variables (temperature, light,

	moisture) and biological pathogens [cite: 110, 111].
CLO 4	Demonstrate pedagogical and analytical competence in presenting plant physiological concepts, crop productivity factors, and stress resistance principles [cite: 109, 110].

5. Teaching Technologies & Methods

• Interactive lectures and multimedia physiological process visual modeling;
• Practical laboratory experiments, microscopic observation, and chemical tests [cite: 111, 112];
• Problem-based learning (PBL), case-study analysis of plant stress, and group discussion;
• Independent student projects, seminar presentations, and analytical reporting [cite: 112, 113].

6. Requirements for Earning Course Credits

Students must master theoretical plant physiology concepts, successfully perform all practical laboratory tasks, complete independent study topics on schedule, actively participate in seminar sessions, and pass the final test evaluation [cite: 112, 113].

7. Assessment Criteria

• Excellent (90–100% / 5): Comprehensive theoretical mastery; independent analytical thinking; accurate experimental performance and scientific reporting [cite: 113].
• Good (70–89.9% / 4): Clear understanding of core physiological processes; accurate practical execution with minor analytical gaps [cite: 113].
• Satisfactory (60–69.9% / 3): Basic familiarity with fundamental plant physiology concepts; partial completion of assignments [cite: 113].
• Unsatisfactory (0–59.9% / 2): Failure to meet course competencies; uncompleted practical tasks; major scientific errors [cite: 113].

8. Recommended Literature & Information Sources

Core Literature:

1. Khojayev, J. Kh. (2004). Plant Physiology [Textbook]. Oqituvchi, Tashkent [cite: 114].
2. Abdullayev, R. A., Asomov, D. K., Beknazarov, B. O., & Safarov, K. S. (2004). Practical Exercises in Plant Physiology [Study Guide]. Universitet, Tashkent [cite: 114].
3. Beknazarov, B. O. (2009). Plant Physiology [Textbook]. National University of Uzbekistan, Tashkent [cite: 114].
4. Sagdiyev, M. T., & Alimova, R. A. (2007). Plant Physiology [Study Guide]. Yangiyol Poligraf-Servis [cite: 114].
5. Taiz, L., & Zeiger, E. (2003 / 2024). Plant Physiology and Development (3rd & 7th eds.). Sinauer Associates / Oxford University Press [cite: 114].

Additional Literature:
6. Mustaqimov, G. D. (1995). Plant Physiology and Basics of Microbiology [Study Guide]. Oqituvchi, Tashkent [cite: 114].
7. Moiseyev, V. A., et al. (1997). Plants of Uzbekistan. Oqituvchi [cite: 114].

Digital Sources:
8. National Library of Uzbekistan: http://www.natlib.uz [cite: 114]
9. ZiyoNET Educational Portal: http://www.ziyonet.uz [cite: 114]
10. MSU Biology Portal: http://bio.msu.ru/study/spescialty/ [cite: 114]

9. UN Sustainable Development Goals (SDG) Alignment

• SDG 2 — Zero Hunger: Aligns by investigating crop productivity, photosynthetic efficiency, mineral fertilization optimization, and agricultural resilience.
• SDG 13 — Climate Action: Addresses plant adaptations to climatic stress factors (drought, thermal extremes), transpiration control, and atmospheric carbon assimilation.
• SDG 15 — Life on Land: Focuses on botanical health, plant pathology, disease prevention, and terrestrial flora protection.
• SDG 4 — Quality Education: Fosters qualified biology educators with modern theoretical and practical knowledge in plant biology and experimental science.