NAVOI STATE UNIVERSITY

UM2802 GENERAL MICROBIOLOGY — COURSE SYLLABUS

Faculty of Natural Sciences and Medicine | Department of Biology | Chemistry Programme

COURSE PASSPORT & ACADEMIC METADATA

Course Title:		**Course Code:**	
General Microbiology		UM2802	
Course Type:		**Field of Study:**	
Elective Course		100000 Education / 110000 Education & Teaching	
Programme:		**Academic Year:**	
60110800 Chemistry		2025–2026	
Semester:		**Form of Education:**	
8 (VIII)		Full-time / Uzbek	
ECTS Credits:		**Total Workload:**	
2 ECTS Credits		60 Hours (30 Contact Hours, 30 Independent Study Hours)	
Weekly Contact Hours:		**Assessment:**	
2 Hours		Final Written Examination	
Curriculum Code:		**Aligned UN SDGs:**	
60110800-2.8		SDG 3 (Good Health); SDG 6 (Clean Water); SDG 12 (Responsible Production); SDG 15 (Life on Land)	



1. Course Description & Scope

The course 'General Microbiology' (UM2802) explores the morphology, cellular anatomy, physiology, nutrition, respiration, genetics, and ecology of microorganisms. It covers biogeochemical cycles (ammonification, nitrification, denitrification, nitrogen fixation), microbial fermentation processes (alcoholic, lactic, butyric, pectin, cellulose), bacteriophages, pathogenic microorganisms, immunology, antibiotic production, and microbial applications in agriculture, biotechnology, and pharmaceuticals [cite: 101, 102, 104].

2. Course Aims & Professional Competencies

Course Aim: To provide students with comprehensive scientific knowledge on microbial biology, metabolic pathways, ecological roles, and applications in bio-synthesis, pharmaceutical production, agricultural sustainability, and environmental protection [cite: 101, 102].

Professional Competencies:

• Knowledge: Understanding microbial classification, cellular structure, metabolic pathways, fermentation mechanics, nitrogen cycles, and principles of immunology and pathogenicity [cite: 101, 102, 106].
• Laboratory & Analytical Skills: Executing microbiological staining, light microscopy, culture media preparation, sterilization/disinfection protocols, and antibiotic susceptibility testing [cite: 102, 104, 106].
• Environmental & Bio-Industrial Competence: Monitoring soil, water, and air microflora, controlling plant pathogens, and utilizing beneficial microbes in waste management and bio-fertilizer production [cite: 102, 103, 106].

3. Prerequisites

• Organic Chemistry, Biochemistry, General Biology, and Fundamental Ecology.

4. Course Learning Outcomes (CLO)

Code	Learning Outcome Description
CLO 1	Explain the cellular anatomy, classification, nutrition, respiration, and genetics of bacteria, fungi, viruses, and bacteriophages [cite: 101, 103, 104].
CLO 2	Perform standard microbiological laboratory analyses, including culture media preparation,

	sterilization, Gram staining, and pure culture isolation [cite: 102, 104].
CLO 3	Evaluate microbial biogeochemical nutrient cycles (nitrogen, carbon, sulfur) and the environmental roles of soil, water, and atmospheric microflora [cite: 101, 103, 104].
CLO 4	Apply microbiological processes in biotechnology, pharmaceutical antibiotic synthesis, agricultural bio-fertilizers, and water sanitation [cite: 101, 102].

5. Teaching Technologies & Methods

• Interactive lectures and multimedia microbiological process modeling [cite: 107];
• Laboratory experimentation, microscopy, and culture isolation [cite: 104];
• Case-study analysis, Group work, and Individual research projects [cite: 107];
• Brainstorming and student seminar presentations [cite: 107].

6. Requirements for Earning Course Credits

Students must master theoretical microbiology concepts, complete all assigned laboratory analyses, submit independent study tasks, actively participate in discussions, and pass the final written examination [cite: 107].

7. Assessment Criteria

• Excellent (90–100% / 5): Deep understanding of microbial physiology, metabolic cycles, and immunology; faultless laboratory diagnostics and analytical accuracy [cite: 106, 107].
• Good (70–89.9% / 4): Clear understanding of core microbiology concepts, fermentation, and microbial ecology; accurate lab execution with minor gaps [cite: 106, 107].
• Satisfactory (60–69.9% / 3): Basic familiarity with fundamental terms (bacteria, viruses, sterilization); partial fulfillment of lab/independent tasks [cite: 106, 107].
• Unsatisfactory (0–59.9% / 2): Failure to meet course competencies; uncompleted lab tasks; major scientific errors [cite: 106, 107].

8. Recommended Literature & Information Sources

Core Literature:
1. Burkhanova, Kh. K., & Murodov, M. M. (1975). Microbiology [Study Guide]. Oqituvchi, Tashkent [cite: 107].
2. Muhamedov, I., Eshboyev, E., Zokirov, N., & Zokirova, M. (2006). Microbiology, Immunology, Virology [Textbook]. Yangi Asr Avlodi, Tashkent [cite: 107].
3. Ganikhodjayeva, A. B., & Nazarova, Kh. A. (2002). Microbiology [Textbook]. Abu Ali Ibn Sino Medical Publishing, Tashkent [cite: 107].
4. Mirkhamidova, P., Vakhobov, A. Kh., Davranov, Q., & Tursunboyeva, G. S. Fundamentals of Microbiology and Biotechnology [cite: 107].

5. Bakhodirova, U. B. (2020). Laboratory Manual in General Microbiology [Study Guide]. Tashkent [cite: 108].
6. Brown, A. E., & Smith, H. R. Microbiological Applications: Laboratory Manual in General Microbiology [cite: 108].
7. Goering, R. V., Dockrell, H. M., Zuckerman, M., & Chiodini, P. L. (2019). Medical Microbiology and Immunology [cite: 108].

Digital Sources:
8. http://microbiology.uz [cite: 108]
9. http://www.nature.uz [cite: 108]
10. http://www.pedagog.uz [cite: 108]

9. UN Sustainable Development Goals (SDG) Alignment

• SDG 3 — Good Health and Well-being: Aligns through the study of pathogenic bacteria/viruses, immunology, epidemiology, and antibiotic production [cite: 101, 103, 104].
• SDG 6 — Clean Water and Sanitation: Aligns via water microflora monitoring, microbial bio-filtration, wastewater treatment, and biological sanitation [cite: 103, 106].
• SDG 12 — Responsible Consumption and Production: Aligns through microbial fermentation technologies, bio-synthesis of enzymes/organic acids, and sustainable food preservation [cite: 101, 104].
• SDG 15 — Life on Land: Aligns by exploring soil microflora, nitrogen fixation, soil fertility enhancement, and natural biological decomposition [cite: 101, 103, 106].