

**MINISTRY OF EDUCATION OF THE REPUBLIC OF AZERBAIJAN
KHAZAR UNIVERSITY**

**SCHOOL OF SCIENCE AND ENGINEERING
DEPARTMENT OF LIFE SCIENCES**

**GENERAL BIOLOGY
SYLLABUS**

**Academic year and semester
Fall semester of the 2026/27 academic year**

Teacher: PhD. Inji Shikhaliyeva

Approved by:

**Head of Department:
PhD J.M.Eldarova**

Identification	Subject	BIO 101, General Biology, 6 credits ECTS
	Department	Life Sciences
	Program	Bachelor
	Term	2026/2027 Fall
	Instructor	PhD, Inji Shikhaliyeva
	Email:	inci.rsh@gmail.com inji.shikhaliyeva@khazar.org
	Classroom/hours	Elshan Mehdiyev St. (Bakikhanov Campus) Lecture: Thursday 08:30 Seminar: Thursday 10:10
Prerequisites		
Language	English	
Compulsory/Elective	Compulsory	
Textbooks and course materials	Main textbooks: 1. Bruce Alberts, Dennis Bray, Karen Hopkins, Alexander Johnson, et al., Essential Cell Biology, 6th edition, Taylor & Francis Group, 2023. 2. Thomas D. Pollard, William C. Earnshaw, Jennifer Lippincott-Schwartz, Graham T. Johnson. Cell Biology, 4th edition, Philadelphia, PA: Elsevier, 2024. 3. Geoffrey M. Cooper. The Cell: A Molecular Approach. Oxford University Press; 8th edition, 2022. 4. Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., & Orr, R. B. (2020). Campbell Biology (12th ed.). Pearson. Additional resources: 1. Kwang W. Jeon et al., International Review of Cell and Molecular Biology, Volume 270 (International Review of Cytology), Academic Press, 2008. 2. Jeon, K. W. (Ed.). (2026). International Review of Cell and Molecular Biology, Volume 399-409. Academic Press. 3. O'Dowd, G., Bell, S., & Wright, S. (2023). Wheater's Functional Histology: A Text and Color Atlas (7th ed.). Elsevier. 4. Trends in Biotechnology Journal. Elsevier. 5. Presentations prepared by the lecturer.	
Course description	The General Biology course covers the fundamental principles and laws governing the living world, as well as the organization of life at the molecular, cellular, organismal, and population levels. The course begins with an overview of the development of biology as a science, including its historical stages, modern theoretical and practical significance, and interactions with other natural sciences. The main part of the course focuses on the structure and functional properties of cells. Students will study the chemical components of cells, cellular organelles and their functions, membrane structure and function, transport of substances across membranes, cellular signaling, energy metabolism, and the cell cycle, including cell division, aging, and cell death. The course also examines the principles of physiological systems in living organisms, with particular emphasis on the similarities and differences in plant, animal, and human physiology. Basic concepts of evolution at the population, species, and ecosystem levels are introduced, along with fundamental principles of ecology and the interactions between living organisms and their environment. An important component of the course is an introduction to integrative areas of modern biology, including systems biology, biotechnology, molecular biology, and related fields. Students will also gain practical experience in the use of microscopes and laboratory equipment and become familiar with fundamental biological laboratory methods and techniques.	
Course objectives	General objective:	

	To master the structure of cells, the functions of organelles and the processes therein, and to master some practical methods available in cytology. Specific objectives: - To identify the academic potential of students, to encourage them to science, and to help them realize their potential. - To introduce academic search platforms and master their use. - To introduce students to the current state of biological research and to master its importance for the development of future science. - To encourage student participation in the course, to ensure an environment of mutual respect and understanding. - To emphasize the connections between cytology and other biological disciplines. - To teach students to work in a team.		
Learning Outcomes	What should students know at the end of the course: 1. The structure of the cell 2. The structure and function of organelles 3. The chemical components of the cell, the synthesis, structure and function of macromolecules 4. The structure of the cell membrane, the mechanisms of transport of substances through the membrane and the transmission of signals 5. The mechanism of expression of genetic information in the cell 6. The life cycle of the cell and the mechanisms of division, the microscopic description of the structural components of the cell, and the methods of research		
Teaching methods	Case analysis		x
	Group discussion		x
	Lecture		x
	Simulation		x
Evaluation Criteria	Methods	Date/deadlines	Percentage (%)
	Midterm Exam	TBA	30
	Quizzes	Once per semester	10
	Practical Assignments	Once per semester	10
	Activity	During the semester	5
	Attendance	End of semester	5
	Final Exam	TBA	40
	Total		100
Class Policy	Lesson Organization -General information about the subject will be provided to students during lectures. -New topics will be explained using visual materials, including PowerPoint presentations and video files. -Before the midterm and final examinations, students' level of understanding will be assessed through quizzes. -During seminar sessions, students' understanding of previously covered topics will be assessed through oral and written activities. An overall Activity grade will be assigned at the end of the semester. -Students are expected to give presentations on assigned topics during the semester. Each presentation, including the discussion at the end, should not exceed 15 minutes. The presentation must be submitted to the instructor in electronic format. Presentation topics and requirements will be explained in greater detail during class. -Laboratory sessions will be conducted during the semester. Students must wear a laboratory coat during laboratory classes. The results of laboratory work must be recorded in a laboratory notebook. Further instructions and requirements will be explained in greater detail during class.		

Rules for using Generative Artificial Intelligence (GAI) Within the framework of this subject, the use of GAI tools is permitted in accordance with the University's "Rules for the use of GAI" to support and enhance the teaching and learning process. Students may use these tools when generating ideas related to the topic, determining initial approaches, and developing a preliminary concept. However, all GAI tools used, as well as their purpose and manner of use, must be disclosed in accordance with the requirements set out in Section 8 ("Citation and Disclosure Rules"). Students are fully responsible for verifying the accuracy, relevance, and reliability of any information obtained through GAI tools. The final work must clearly demonstrate the student's independent approach, personal analysis, critical thinking, and individual intellectual contribution to the topic. Attendance Regular attendance and active participation in all classes are essential. Students who are absent for valid reasons (e.g., illness or family circumstances) must submit the relevant documentation to the faculty dean's office. Students who miss more than 25% of classes will not be permitted to take the examination. Lateness and other class violations A student who arrives more than 10 minutes late to class will be recorded as absent but may still attend the class. A student who is unable to take an examination for a reason that has been reported to the instructor and the dean's office in advance may take the examination the following week. Examinations All matters related to students' participation in or absence from examinations are handled by the faculty administration. Topics covered in the midterm and final examinations will be provided to students before the respective examinations. Questions used in the midterm examination will not be repeated in the final examination. Violations of examination rules During midterm and final examinations, students are prohibited from disrupting the examination process or communicating with other students and exchanging information. The examination work of any student who violates these rules will be canceled, and the student will be excluded from the examination and receive a grade of 0 (zero). Requirements for completing the subject In accordance with the University's rules, a minimum overall achievement score of 60% is required to complete the course successfully. A student who does not meet this requirement may retake the subject in the following semester or academic year, in accordance with University regulations. Student conduct rules During class, students are expected to maintain an appropriate learning environment and comply with academic and ethical standards. Disruptive behavior, unauthorized discussions, and the use of mobile phones without permission are prohibited during classes.			
Tentative Schedule			
Week	Date/Day (tentative)	Topics	Textbook/Assignments
1	17.09.2026	Subject and tasks of general biology: molecular-chemical foundations of biology as a science of life. Structural levels of life and general properties of living organisms.	Campbell Biology (12th ed.). Chapter 1
2	24.09.2026	The cell is the fundamental unit of life. Cell theory. Prokaryotic and eukaryotic cells: differences. Structure of the eukaryotic cell. General information about cell organelles - structure and functions.	Essential Cell Biology, 6th edition, Chapter 1, pages. 35-65

			Chapter 2, pages. 73-115; Chapter 4 pages. 153-205. Cell Biology 4th edition, Chapter 3, pages. 31-52
3	1.10.2026	Cellular molecules. Nucleic acids (DNA and RNA), their structure and functions. The structure of chromosomes in eukaryotes, their assembly at different levels. DNA replication.	Essential Cell Biology, 6th edition, Chapter 5, pages. 207-230. Cell Biology 4th edition, Chapter 7-8, pages. 107-142
4	8.10.2026	From DNA to protein. Transcription. Introns and exons. Processing of eukaryotic mRNA in the nucleus. Transport of mature mRNA from the nucleus to the cytoplasm. Translation.	Essential Cell Biology, 6th edition, Chapter 6-7, pages. 233-300.
5	15.10.2026	Structure of the cell membrane. Transport through the membrane. Lipid bilayer. Formation of the membrane. Membrane proteins. Transport through the cell membrane. Principles of transmembrane transport. Transporters (carriers) and their function. Ion channels and membrane potential.	Essential Cell Biology, 6th edition, Chapter 11, pages. 399-422. Cell Biology 4th edition, Chapter 13, pages. 227-239
6	22.10.2026	Mitochondria, chloroplasts and peroxisomes. Energy supply of the cell. The cell's acquisition of energy from nutrients. Breakdown and utilization of sugars and fats. Regulation of metabolism. Energy generation in mitochondria and chloroplasts. Mitochondria and oxidative phosphorylation. Chloroplasts and photosynthesis.	Essential Cell Biology, 6th edition, Chapter 14, pages. 489-528. The Cell: A Molecular Approach, 8 edition, Chapter 13, pages. 147-157
7	29.10.2026	Cytoskeleton. Intermediate filaments. Microtubules. Actin filaments. Muscle contraction.	Essential Cell Biology, 6th edition, Chapter 17, pages. 607-640.
8	5.11.2026	Midterm Exam	
9	12.11.2026	Cell division. General principle of cell division. Cell cycle regulation system. Cyclin G1, S and M phases. Mitosis. Cytokinesis. Regulation of cell number and size.	Essential Cell Biology, 6th edition, Chapter 18, pages. 643-670. The Cell: A Molecular Approach, 8th edition, Chapter 18, pages. 204-214
10	19.11.2026	Cell renewal and cell death. Apoptosis. Necrosis. Stem cells. Classification and properties.	Essential Cell Biology, 6th edition, Chapter 20, pages. 726-750 International Review of Cell and Molecular Biology, Chapter 399-409.
11	26.11.2026	Cell groups. Tissues. Extracellular matrix and connective tissues. Organs and systems.	The Cell: A Molecular Approach, 8th edition, Chapter 19, pages. 216-225 Campbell Biology (12th ed.). Chapter 40
12	3.12.2026	Biological diversity. Bacteria and Archaea. Viruses, their morphology, classification, evolution and infections.	Campbell Biology (12th ed.). Chapter 19, 27

13	10.12.2026	Fungi. Plant and animal kingdom. Classifications. Introduction to organisms. Systems and functions.	Campbell Biology (12th ed.). Chapter 29, 30, 31, 32
14	17.12.2026	General research methods. Cell, molecular and genetic laboratories. Methods of research of cells. Types of microscopes.	The Cell: A Molecular Approach, 8th edition, Chapter 1, pages. 16-24
15	24.12.2026	Biotechnology. Biotechnology methods. Innovations in this field. Biotechnology laboratories and research methods.	Trends in Biotechnology Journal.