

<b>Identification</b>	<b>Subject</b>	BIOT150, Introduction to Biotechnology, 6 ECTS
	<b>Department</b>	Life Sciences
	<b>Program (Undergraduate, Graduate)</b>	Bachelor
	<b>Term</b>	Spring 2026
	<b>Instructor</b>	Cand. Biol.Sci. Mehdi Ali
	<b>Email:</b>	<a href="mailto:mehdi.ali@khazar.org">mehdi.ali@khazar.org</a>
	<b>Classroom/hours</b>	
<b>Prerequisites</b>	None	
<b>Language</b>	English	
<b>Compulsory/ Elective</b>	Compulsory elective	
<b>Textbooks and course materials</b>	<p><b>Main textbooks:</b></p> <p>A. Godbey, W. T. (2014). <i>An introduction to biotechnology: The science, technology and medical applications</i>. Academic Press (Elsevier).</p> <p>B. Orange County Biotechnology Education Collaborative. (2026). <i>Introduction to biotechnology</i>. LibreTexts.</p> <p><b>Additional sources:</b></p> <p>C. Smith, J. E. (2018). <i>Biotechnology</i> (6th ed.). Cambridge University Press.</p> <p>D. Primrose, S. B., Twyman, R. M., &amp; Old, R. W. (2001). <i>Principles of gene manipulation and genomics</i> (6th ed.). Blackwell Science.</p> <p>Glazer, A. N., &amp; Nikaido, H. (2007). <i>Microbial biotechnology: Fundamentals of applied</i></p> <p>Nature Education. (n.d.). <i>Scitable: Biotechnology</i>.  <a href="https://www.nature.com/scitable/knowledge/biotechnology-13228225/">https://www.nature.com/scitable/knowledge/biotechnology-13228225/</a></p> <p>Khan Academy. (n.d.). <i>Biotechnology</i>.  <a href="https://www.khanacademy.org/science/ap-biology-gene-expression-and-regulation/biotechnology">https://www.khanacademy.org/science/ap-biology-gene-expression-and-regulation/biotechnology</a></p> <p>LibreTexts Biology. (2026). <i>Biotechnology</i>. <a href="https://bio.libretexts.org">https://bio.libretexts.org</a></p> <p>National Centre for Biotechnology Information. (n.d.). <i>Educational resources</i>.</p> <p>National Library of Medicine. <a href="https://www.ncbi.nlm.nih.gov/education/">https://www.ncbi.nlm.nih.gov/education/</a></p>	
<b>Course description</b>	<p>This course introduces biotechnology as an interdisciplinary field that applies biological systems and molecular processes to technological and medical applications. It covers fundamental concepts of cell biology, genetics, and biochemical mechanisms, along with key experimental methods used in biotechnology. The course traces the historical development of biotechnology from early practices to modern genetic engineering and molecular techniques. Significant areas of biotechnology, including microbial, agricultural, medical, and industrial biotechnology, are examined. Ethical, safety, and regulatory aspects are also introduced. By the end of the course, students will understand the principles, methods, and applications of biotechnology and their relevance to contemporary scientific and societal challenges.</p>	

<b>Course objectives</b>	The goal of this course is to provide students with a foundational understanding of the scientific principles, methods, and applications of biotechnology, enabling them to explain how biological systems and molecular processes are used in technological, medical, and industrial contexts.		
<b>Learning Outcomes</b>	<p>Upon successful completion of this course, students will be able to:</p> <ul style="list-style-type: none"> <li>– Explain the fundamental biological, chemical, and molecular principles underlying biotechnology.</li> <li>– Describe the historical development and major branches of biotechnology, including medical, agricultural, microbial, and industrial applications.</li> <li>– Identify and interpret core biotechnological methods such as genetic engineering, cell culture, fermentation, and molecular analysis techniques.</li> <li>– Apply basic concepts of genetics and molecular biology to explain how biological systems are manipulated for technological purposes.</li> </ul>		
<b>Teaching methods</b>	<b>Case analysis</b>		x
	<b>Group discussion</b>		x
	<b>Lecture</b>		x
	<b>Simulation</b>		x
<b>Evaluation Criteria</b>	<b>Methods</b>	<b>Date/deadlines</b>	<b>Percentage (%)</b>
	<b>Midterm Exam</b>	<b>TBA</b>	30
	<b>Assignments and quizzes 1 &amp; 2</b>		10
	<b>Laboratory (Activity)</b>		10
	<b>Individual presentation</b>		5
	<b>Attendance</b>		5
	<b>Final Exam</b>	<b>TBA</b>	40
	<b>Total</b>		100
<b>Class Policy</b>	<p><b>Course Organization</b></p> <ul style="list-style-type: none"> <li>➤ General information related to the subject will be delivered to students during the classes.</li> <li>➤ New topics will be explained using visual aids (PPT and video files).</li> <li>➤ Before the midterm and final exams, students' level of understanding will be assessed through quizzes.</li> <li>➤ Students' grasp of previous topics will be evaluated in each class through oral and written questioning; at the end of the semester, a cumulative grade will be given (Activity).</li> <li>➤ Throughout the semester, it is mandatory to deliver individual presentations on assigned topics. The presentation time, including discussion at the end, should not exceed 15 minutes. The issues and rules of presentations will be explained in more detail during the course.</li> </ul> <p><b>General rules</b></p> <p><b>Attendance</b></p>		

Participation in all classes is mandatory. If students miss classes for specific reasons (e.g., illness, family circumstances), they must submit the relevant information to the faculty dean's office. Students who miss more than 25% of classes are not allowed to take the exam.

**Lateness**

A student who arrives more than 10 minutes after the scheduled start time is considered absent. Nevertheless, the student is still allowed to join the class session.

**Quizzes**

If a student misses a quiz for reasons previously reported to the instructor and the dean's office, they are permitted to take the quiz in the following week.

**Exams**

The faculty administration decides all matters related to student participation in exams or their absence. Missing an exam is permitted only with the dean's approval. Absence due to public activities is not accepted as an excuse. Exams must be cumulative. The topics for the midterm and final exams are given to students in advance. In the final exam, most questions are based on the material covered after the midterm.

**Completion of the Course**

A student who scores 60% or higher is considered to have completed the course. Otherwise, the student must retake it.

**Violation of Exam Rules**

If existing rules are violated during exams (such as attempts to cheat, cheating, disrupting the exam process, or other unlawful actions), the student's exam paper is annulled.

**Classroom Conduct**

Students must do everything possible to maintain an appropriate academic environment during class. Unauthorised talking, unnecessary movements, and other inappropriate behaviour are strictly prohibited. Students must actively participate in class, ask questions when necessary, and refrain from interrupting discussions.

Disruption of the class process or violation of ethical standards, unauthorised discussions, and the use of mobile phones during class are strictly prohibited.

**Tentative Schedule**

<b>Week</b>	<b>Date/Day (tentative)</b>	<b>Topics</b>	<b>Textbook/Assignments</b>
1.	16.02.2026	<b>Topic No. 1.</b> Biotechnology as a Scientific and Applied Discipline	<i>A (Ch. 1, Preface); B (overview sections); C (Introductory chapters)</i>
2.	23.02.2026	<b>Topic No. 2.</b> Historical Development of Biotechnology	<i>C (historical overview); A (Preface, historical remarks); B (introductory pages)</i>

3.	02.03.2026	<b>Topic No. 3.</b> The Cell as the Basic Unit of Biotechnology	<i>A (Ch. 1–5: membranes, proteins, genes, cell growth); B (cell structure and techniques)</i>
4.	09.03.2026	<b>Topic No. 4.</b> Fundamentals of Molecular Biology for Biotechnology	<i>A (Ch. 4: Genes; Ch. 11: PCR); D (gene expression basics)</i>
5.	16.03.2026	<b>Topic No. 5. (Quiz 1)</b> Enzymes and Biocatalysis	<i>A (Ch. 2: Proteins; enzyme-related sections); C (industrial enzyme applications)</i>
6.	23.03.2026	<b>Topic No. 6.</b> Microorganisms in Biotechnology	<i>E (core chapters on microbial biotechnology); A (Ch. 6: microbial killing; fermentation links)</i>
7.	30.03.2026	<b>Topic No. 7.</b> Principles of Cell Culture	<i>A (Ch. 7: Cell culture; Ch. 17 sections); B (aseptic techniques, lab practice)</i>
8.	06.04.2026	<b>Topic No. 8.</b> Bioreactors and Biotechnological Processes	<i>A (Ch. 16–17: fermentation, bioreactors); E (industrial-scale processes)</i>
		<b>Midterm exam</b>	
9.	13.04.2026	<b>Topic No.</b> Genetic Engineering: Principles and Methods	<i>D (core textbook for this lecture); A (Ch. 12–13: cloning, gene delivery)</i>
10.	20.04.2026	<b>Topic No. 10.</b> Plant Biotechnology	<i>C (plant biotechnology chapters); A (Ch. 18: transgenics)</i>
11.	27.04.2026	<b>Topic No. 11.</b> Animal Biotechnology	<i>A (Ch. 17–18: stem cells, transgenics); C (animal and medical biotech sections)</i>
12.	04.05.2026	<b>Topic No. 12.</b> Medical and Pharmaceutical Biotechnology	<i>A (Ch. 17: stem cells, tissue engineering); C (medical biotechnology)</i>
13	11.05.2026	<b>Topic No. 12. (Quiz 1)</b> Industrial and Environmental Biotechnology	<i>E (environmental &amp; industrial biotech); A (Ch. 16: biofuels; applied processes)</i>
14	18.05.2026	<b>Topic No. 12.</b> Bioethics and Biosafety	<i>B (lab safety, GMP, biosafety); C (ethical and regulatory discussions)</i>
15	25.05.2026	<b>Topic No. 12.</b> Current Trends and Future Perspectives in Biotechnology	<i>A (late chapters; concluding sections); C (future directions)</i>
		<b>Final exam</b>	