

Alanya Alaaddin Keykubat University | Rafet Kayış Faculty of Engineering
Genetics and Bioengineering Department
 2026-2027 Fall Semester

Syllabus

Code/Name	GBE 211 GBE Lab III
Type	Required
Credit/ECTS	2/3
Hour per Week	4 (0+0+4)
Level/Year	Undergraduate/2
Semester	Fall
Classroom	EL-Z-4 (MUHL-016 Chemistry Lab)
Content	This laboratory course integrates advanced principles of cell biology, molecular genetics, and biochemistry through hands-on experimentation, complementing concurrent theoretical courses (GBE 203, GBE 205, GBE 209). It covers comprehensive laboratory workflows including aseptic cell culture, primary tissue dissociation, genetic transformation, recombinant protein expression, and downstream processing (protein extraction, chromatographic purification, and quantification). Students will also utilize analytical techniques such as SDS-PAGE and Western Blotting. Emphasizing interdisciplinary applications, students will incorporate mathematical and thermodynamic modeling (GBE 201, GBE 207) into their data analysis and communicate findings weekly through formal, publication-standard laboratory reports aligning with SEC 201.1 requirements.
Prerequisites	---
Textbooks	Primary GBE 211 Laboratory Handouts
Objectives	• Perform advanced aseptic techniques, cell culture handling, and primary cell isolation. • Execute molecular genetics protocols, including the preparation of competent cells, bacterial transformation, and the induction of recombinant protein expression. • Apply biochemical downstream processing methods, including protein extraction, affinity chromatography, and quantitative macromolecule concentration assays. • Utilize advanced analytical techniques, specifically SDS-PAGE and Western Blotting, to assess protein purity and identity. • Synthesize experimental data using mathematical and thermodynamic principles, communicating findings through weekly formal laboratory reports formatted to professional academic standards.
Course Outcomes	Upon successful completion of this course, students will be able to: C01: Demonstrate proficiency in aseptic techniques, cell culture maintenance, and the isolation and staining of primary cells from animal tissues. C02: Perform genetic manipulation techniques, including bacterial transformation and the targeted induction of recombinant protein expression. C03: Execute downstream bioprocessing and analytical techniques to extract, purify (affinity chromatography), and characterize target proteins (SDS-PAGE, Western Blotting). C04: Conduct applied biochemical assays to evaluate antimicrobial efficacy, antioxidant capacity, and food macromolecule composition. C05: Formulate comprehensive laboratory reports every week that rigorously detail methodologies, analyze quantitative data mathematically, and communicate scientific conclusions effectively.

W	Topic

Alanya Alaaddin Keykubat University | Rafet Kayış Faculty of Engineering
Genetics and Bioengineering Department
 2026-2027 Fall Semester

1	Lab Safety & Report Guidelines (Establishing SEC 201.1 reporting standards)
2	Cell Culture and Aseptic Condition
3	Cell Counting with Hemocytometer (Applying population growth modeling)
4	Isolation and Staining of Cells from Chicken Tissues (Heart, Liver, Muscle)
5	Preparation of Competent Cells & <i>E. coli</i> Transformation
6	Fermentation, Medium Prep, and Protein Expression Induction
7	Protein Extraction from Different Biological Sources & Precipitation
8	Chromatographic Methods for Protein Purification (Affinity Chromatography)
9	Determination of Protein Concentration (Standard curve generation)
10	Purity Analysis by SDS-PAGE
11	Western Blotting
12	Preparation of Plant Extracts and Antimicrobial Activity Testing Using <i>E. coli</i>
13	Determination of Antioxidant Activity Using the DPPH Assay
Professional Contribution	To classify the kingdom of living things in the general biology laboratory, to get to know them closely and to have knowledge.

Contribution to Program Outcomes*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	0	0	3	4	1	1	3	0	0	0
CO2	2	1	0	3	4	0	1	3	0	0	0
CO3	2	1	0	4	4	0	1	3	0	0	0
CO4	2	1	0	3	4	0	1	3	0	0	0
CO5	2	2	0	4	5	0	3	1	5	0	2

* Contribution Level | 0: None | 1: Very Low | 2: Low | 3: Medium | 4: High | 5: Very High

Special Conditions	- Students work in groups. - Experimental studies are reported using MS Word										
Requirements											
Course Policy	- Students must arrive in the class or laboratory on time. - Both students and the lecturer must communicate in English. - Students should prepare by reading lab notes and assigned articles prior to the lab session each week. - At least 80% attendance is required; otherwise, a grade of DZ will be assigned.										
Cheating & Plagiarism	- Copying or letting someone copy anyone's work on exams, assignments, or reports is cheating. - Cutting and pasting text, figures, and tables from web sources, ChatGPT, or any other electronic source is plagiarism. - The consequence of academic dishonesty is to receive a grade of FF for the course.										
Evaluation	<table> <tr> <td>Quizzes</td><td>10%</td></tr> <tr> <td>Lab Reports</td><td>20%</td></tr> <tr> <td>Midterm</td><td>30%</td></tr> <tr> <td>Final Exam</td><td>40%</td></tr> <tr> <td>Total</td><td>100%</td></tr> </table>	Quizzes	10%	Lab Reports	20%	Midterm	30%	Final Exam	40%	Total	100%
Quizzes	10%										
Lab Reports	20%										
Midterm	30%										
Final Exam	40%										
Total	100%										

Alanya Alaaddin Keykubat University | Rafet Kayış Faculty of Engineering
Genetics and Bioengineering Department
2026-2027 Fall Semester

Rubric	The evaluation rubric for laboratory reports is available on the Department's official website.
---------------	---

Instructor

Name/Surname	Özgür Öztürk	Email	ozgur.ozturk@alanya.edu.tr
Room 210	Office Hours	Wednesday-Thursday T 10.30-12.30	

Prepared by Özgür Öztürk on October 1st, 2026.