

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

Syllabus

Code/Name	Sec 403.1 / Cell Culture Techniques
Type	Elective
Credit/ECTS	5/5
Hour per Week	3 (3+0+0)
Level/Year	Undergraduate/4
Semester	Fall
Classroom	D306
Content	A theoretical introduction to mammalian (immortalized and primary) and insect cell culture systems. Topics include laboratory setup and aseptic practices, culture environment design, routine maintenance and authentication, genetic manipulation methods, cell separation and characterization techniques, 3D culture approaches, and cryopreservation. The course concludes with interpretation of experimental data such as cell counts, viability, and cytotoxicity assays, emphasizing critical evaluation and discussion of modern cell culture techniques.
Prerequisites	-----
Textbooks	Primary - Culture of Animal Cells: A Manual of Basic Technique, 5th Edition. R. Ian Freshney. - <i>Basics of Cell Culture: A Student Laboratory Manual</i>. Golnar Afshar. Supplementary Fundamental techniques in cell culture: Laboratory handbook (4th ed.): https://www.sigmaaldrich.com/deepweb/assets/sigmaaldrich/marketing/global/documents/177/566/ecacc-handbook-br2808en-mk.pdf?srsId=AfmBOoo9DyDpKWxqbX_2a_fYNyqFvkwoPH2yI6QHuUDCQWZff1zL3LC8 Introduction to Cell and Tissue Culture Theory and Technique, Jennie P. Mather and Penelope E. Roberts.
Objectives	By the end of this course, students will be able to: - Explain the principles of laboratory setup, aseptic technique, sterilization, contamination control, and cryopreservation. - Compare different cell culture systems (primary, continuous, adherent suspension, mammalian, insect etc) in terms of requirements, advantages, and limitations. - Explain the composition and role of culture media, supplements, and vessels, and how they support cell growth and viability. - Discuss genetic manipulation methods (e.g., transfection, transduction, CRISPR), differentiation processes, cloning strategies, and advanced approaches such as culture and cell separation/characterization. - Interpret and evaluate experimental data in the context of research and biotechnology.
Course Outcomes	In this course you will be able to: C01 Explain the principles of aseptic technique, laboratory setup and culture media formulation to establish, maintain, and cryopreserve viable cell cultures. C02 Evaluate different cell culture systems to determine their suitability, advantages, and limitations for specific biotechnological applications. C03 Discuss the integration of genetic manipulation and differentiation processes within <i>in vitro</i> environments to develop and culture specialized cellular models. C04 Function collaboratively within a team environment to research and communicate recent advances in cell culture methodologies effectively in English. C05 Analyze and interpret cell culture-related experimental data to draw evidence-based conclusions for research and biotechnology.

Weekly Schedule of Topics

W	Topic
1	Introduction & Overview of Cell Culture
2	Laboratory Setup, Biosafety, Aseptic Technique & Sterilization
3	Cell Culture Media, Supplements & Culture Vessels
4	Primary Culture
5	Continuous and Immortalized Cell Lines
6	Routine Maintenance, Subculture, Counting & Viability
7	Cell Line Authentication & Contamination Control
8	Genetic Manipulation Methods in Mammalian Cell Lines
9	Insect Cell Culture
10	Cryopreservation & Recovery
11	Immunocytochemistry and Cell-Based Assays
12	Flow Cytometry, Cell Separation & Characterization
13	Advanced Cell Culture Methods, 3D Culture & Organoids
14	Student Presentations

Professional Contribution To gain the knowledge and skills needed to work in cell culture labs and to design research projects in this field.

Contribution to Program Outcomes*

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

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

Special Conditions -

Requirements	Basic knowledge of Cell Biology, Molecular Cell Biology and Biochemistry	
Course Policy	• Be in the class on time. • English should always be used to communicate with one another. • At least 70% attendance is required, otherwise a grade of DZ will be assigned.	
Cheating & Plagiarism	• Copying or letting someone copy your work on exams, assignments, or reports is cheating • Using uncredited content from electronic sources or AI tools constitutes plagiarism. • The consequence of academic dishonesty is to receive a grade of FF for the course.	
Evaluation	Mid-term Exam	30%
	Group Presentation	10%
	Final Exam	60%
	Total	100%
Rubric	-----	

Instructor

Name/Surname	Senem UYLAŞ	Email	senem.uylas@alanya.edu.tr
Room	329	Office Hours	Thursday 11:00-13:20

Prepared by Senem UYLAŞ on September 28th, 2026.