Alanya Alaaddin Keykubat University | Rafet Kayış Faculty of Engineering
Genetics and Bioengineering Department
2024-2025 Fall Semester

Syllabus

Code/Name	SEC 403.6 Plant Biotechnology
Type	Elective
Credit/ECTS	5/5
Hour per Week	3 (3+0+0)
Level/Year	Undergraduate/4
Semester	Fall
Classroom	D306
Content	Introduction to plant biotechnology, tissue culture and *in vitro* regeneration methods, somatic embryogenesis, protoplast cultures, analysis and diagnosis of transgenic proposals, transgenic plants without markers, plants made with model plants, transgenic studies for seed breeding, transgene studies for reproduction in pests, and abiotic stress. Transgene studies related to resistance production, application use in recombinant protein, antibody, antigen, vaccine production, GMO biosafety-related issues.
Prerequisites	Genetic Engineering I and II
Textbooks	***Primary*** PLANT BIOTECHNOLOGY AND GENETICS: Principles, Techniques, and Applications Edited by C. Neal Stewart, Jr. University of Tennessee Knoxville, Tennesse WİLEY 2008. ***Supplementary*** Latest scientific papers.
Objectives	• Describe biotechnology tissue and culture terms • Define tissue culture methods. • Comparison of modern breeding and conventional breeding methods • Recognize what GMO is • Explain of GMO applications.
Course Outcomes	In this course you will be able to: CO1 Distinguish plant tissue culture techniques and culture types. CO2 Identifies risks and opportunities associated with transgenic plants. CO3 Describe the principles and applications of gene editing methods CO4 Explain how plants can be used as bioreactors CO5 Identify information about genetic markers and their use in plant breeding.

Weekly Schedule of Topics

W	Topic
1	Concepts of biotechnology, tissue culture and its history
2	Totipotency and morphogenesis, nutritional requirements
3	Techniques of *in vitro* cultures, micropropagation
4	Haploid production and uses, ovule culture
5	Ovary and embryo culture, test tube fertilization
6	Endosperm culture, factors influencing morphogenesis
7	Applications and achievements, somaclonal variation and crop improvement
8	Somatic embryogenesis, protoplast isolation
9	Products of somatic hybrids and cybrids, genetic engineering in plants

10	Enzymes used in genetic engineering, vectors: the carriers of DNA molecules
11	Gene cloning, gene delivery methods in plants
12	Transgenic plants and their applications, blotting techniques
13	DNA fingerprinting, DNA markers in plant genome analysis
14	QTL mapping, marker-assisted selection, and crop improvement

Professional Contribution	Ability to use the advanced methods used in plant biotechnology and the basic and advanced topics on which these methods are based.

Contribution to Program Outcomes*

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

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

Special Conditions	Students work in groups for the presentations.
Requirements	Basic knowledge of Genetic Engineering I and II
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. • You must prepare a project, otherwise you will not be graded for the project.
Cheating & Plagiarism	• Copying or letting someone copy your work on exams, assignments, or reports is cheating. • Cutting and pasting text, figures, and tables from web sources or any other electronic source is plagiarism. • The consequence of academic dishonesty is to receive a grade of **FF** for the course.
Evaluation	Midterm Exam 25% Quizzes (2) 10% Project 20% Final Exam 45% Total 100%
Rubric	A rubric will be announced before the project sessions. The rubric has 2 main parts for the grading: technical assessment and writing or project performance.

Instructor

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Room	3rd Floor	Office Hours	Wednesday 10:30-11:15

Prepared by Şurhan Göl October 10th, 2024