



**College of Agricultural Engineering Sciences
Department of Horticulture**

**Plant Biotechnology
Unit Guide
Second-Year Undergraduate
First Semester, 2023 - 2024**

Course Book

1. Course name	Plant Biotechnology
2. Lecturer in charge	Dr Noura Masseh Ellya Kka
3. Department / College	Horticulture / Agricultural Engineering Sciences
4. Contact	Email: noura.kka@su.edu.krd
5. Time (in hours) per week	Theory 2 h, Practical 3 h
6. Office hours	I am usually available after class (Sunday 10:30 am – 12:00 pm) or you can arrange an appointment. It is best to email me to set up a meeting time. Please use my direct email address for this purpose.
7. Course code	AgH1201
8. Teacher's academic profile	Dr Noura Kka https://academics.su.edu.krd/noura.kka Mr. Pirot Jawdat Bazzaz https://academics.su.edu.krd/pirot.bazzaz
9. Keywords	Plant Genomes, Functional Genomics, Genetically Modified Crops
10. Course overview:	This course provides an overview of the principles and applications of biotechnology in the field of plant science. Topics include genetic modification, tissue culture, molecular markers, and the societal and ethical aspects of plant biotechnology.
11. Course objective:	This unit has been specifically designed to introduce students to: <ul style="list-style-type: none"> - Understand the fundamental principles of plant biotechnology. - Explore the techniques and tools used in genetic modification of plants. - Examine the role of tissue culture in plant propagation and breeding. - Investigate molecular markers and their applications in plant research. - Develop critical thinking and problem-solving skills in plant biotechnology.
12. Student's obligation	<p>Attendance Attendance for this class is mandatory. Attendance will be confirmed with evaluation sheets. Each unexcused absence will result in the lowering of your final grade by one grade.</p> <p>Academic Honesty and Integrity Cheating of any kind will not be tolerated. Copying of others' work, use of disallowed material, plagiarism in assignments, or cheating in any other form as defined by the instructor will result in a grade of zero for that assignment. Multiple infractions will result in a grade of 'Fail' for the course.</p> <p>Student Conduct Students are expected to respect the rights of others in the class. Cell phones and other electronic equipment should be turned off prior to the beginning of class. Use of these items during class time, or any other unwarranted classroom disruption, will result in your immediate excusal from class for the remainder of the period. You may bring drinks to class. Please finish any meals before class begins. The use of tobacco products during class time is strictly prohibited.</p>

13. Forms of teaching

Lectures (Teaching by presentation), classroom teaching (class discussion),

Integrating Technology (electronic mail and Google classroom)

English is the main language for teaching in addition to Arabic and Kurdish.

Google classroom: This course will be enhanced using Google classroom. Students are required to download PowerPoint presentations and other important class material from Google classroom for the course

For Google classroom you only need to login with university account (example@student.su.edu.krd) and password.

Google classroom applications is available in play store.

14. Assessment scheme

Theory	Percentage of Overall Mark
10 x pre-quizzes	5%
First midterm test	5%
Thursday October 3, 2023 at 9:00 -10:15 am Covers topics (Week 1 to Week 4).	
Second midterm test	5%
Thursday November 7, 2023 9:00 -10:15 am Covers topics up (Week 5 to Week 8).	
Practical	
12 x quizzes	5%
Presentation	5%
First midterm test	15%
Second midterm test	10%
Final exam	
Theory (Week 1 – Week 12)	50%
TOTAL	100%

15. Student learning outcome:

Students will be able to learn about:

1. Shifting genes from one thing to another (Gene technologies)
2. How a plant reacts to what is going on. (Functional genomics)
3. Developing new crops (Molecular biology).
4. Bioinformatics
5. Ethical issues involved in biotechnology.

16. Course Reading List and References:

Lecture notes, class notes provided or recommended by the lecturers will be sufficient for the course.

- Although there are prescribed text books, the students can refer to the following books.
 1. Ricroch, A., S. Chopra, and S.J. Fleischer, *Plant biotechnology: experience and future prospects*. 2014: Springer.
 2. Altman, A. and P.M. Hasegawa, *Plant biotechnology and agriculture: prospects for the 21st century*. 2011: Academic press.
 3. Stewart Jr, C.N., *Plant biotechnology and genetics: principles, techniques, and applications*. 2016: John Wiley & Sons.

4. Reece, J.B., L.A. Urry, M.L. Cain, S.A. Wasserman, P.V. Minorsky, and R.B. Jackson, *Campbell biology*. Vol. 9. 2011: Pearson Boston.

5. Becker J M. , Caldwell G A. ZEA Biotechnology: A Laboratory Course. (1996)

6. Fletcher L, Goss E, Phelps P, Grady SO Introduction to Biotechnology Laboratory Manual. (2011)

7. Slater, A., Scott, N. and Fowler, M., 2008. Plant biotechnology: the genetic manipulation of plants. OUP Oxford.

8- Ranabhatt, H. and Kapor, R., 2018. Plant Biotechnology. Woodhead Publishing India.

9- Campbell, Neil A.; Urry, Lisa A.; Cain, Michael L; Wasserman, Steven A.; Minorsky, Peter V. 2020. Biology: A Global Approach, Global Edition, Pearson Higher Ed

17. The Topics:

Lecturer's name

Unit weekly activities

Theory

Week	Class topics	Assessment tasks	Date
1	History of plant biotechnology		5/9/2023
2	Plant genomes: the organisation and expression of plant genes	quiz 1 week 1	12/9/2023
3	Techniques for plant transformation	quiz 2 week 2	19/9/2023
4	Binary vectors for plant transformation	quiz 3 week3	26/9/2023
5	First midterm exam		3/10/2023
6	The genetic manipulation of herbicide resistance	quiz 4 week 4	10/10/2023
7	The genetic manipulation of pest resistance	quiz 5 week 5	17/10/2023
8	Plant disease resistance	quiz 6 week 6	24/10/2023
9	Reducing the effects of viral disease	quiz 7 week 7	31/10/2023
10	Second midterm exam		7/11/2023
11	Strategies for engineering stress tolerance	quiz 8 week 8	14/11/2023
12	The improvement of crop yield and quality	quiz 9 week 9	21/11/2023
13	Molecular farming	quiz 10 week 10	28/11/2023
14	Future prospects for GM crops		5/12/2023

Class content may change slightly and classes may overlap

Practice

Week	Class topics	Assessment tasks
1	Biotechnology Laboratory Security & Safety	
2	Documentation: The Lab Notebook & Lab Report	quiz 1 week 1
3	Math Skills for the Laboratory	quiz 2 week 2
4	Basic tools in the biotechnology laboratory	quiz 3 week3
5	Using a Micropipette	quiz 4 week 4
6	Preparing solutions	quiz 5 week 5
7	Preparation of Culture Media	quiz 6 week 6
8	DNA extraction	quiz 7 week 7
9	Gel electrophoresis	quiz 8 week 8
10	Mining biological databases on the internet	quiz 9 week 9
11	Bioinformatics Translation Exercise	quiz 10 week 10
12	Finding Mutant Sequences	quiz 11 week 11
13	Bioinformatics 1	
14	Bioinformatics 2	

Class content may change slightly, and classes may overlap.

19. Examinations:

Questions and Answers template

- **When biotechnology has revolutionized plant agriculture?**

Since the first **stably transgenic plant** produced in the early **1980s** and the first **commercialized transgenic plant in 1994**, biotechnology has revolutionized plant agriculture.

- **How much transgenic cropland has been planted worldwide?**

More than a billion acres of transgenic cropland has been planted worldwide.

- **How many transgenic plants grown? And for what reason the transgenic crops were produced in the United States alone?**

Over 50 trillion transgenic plants grown in the United States alone. In the United States, over half of the corn and cotton and three-quarters of soybean produced are transgenic for **insect resistance**, **herbicide resistance**, or both.

Bt transgenic crops are designed to: A) Make crops cold resistant B) Provide resistance to insects C) Make crops heat resistant D) Improve nutritional value of crops E) Increase vitamin B content

20. Extra notes:

Please feel free to come and talk to me to get helpful feedback on your progress, or if you are struggling in any way.

This course book provides you with the key information about Plant biotechnology.

For the best chance of success, you should read it very carefully and refer to it frequently throughout the semester.

21. Peer review

Standard guidelines were followed and it is clear.

- There are sufficient topics and examples.
- References are relevant, recent and available.