



Department of Plant protection

College of Agricultural Engineering Sciences

Salahaddin University

Subject: Biotechnology

Course Book – (Year 3)

Lecturer's name: Karzan Kazm Mahmud, PhD

Academic Year: 2022/2023

Course Book

1. Course name	Biotechnology
2. Lecturer in charge	Dr. Karzan Kazm Mahmud
3. Department/ College	Plant protection department/ Agricultural Engineering Sciences college
4. Contact	e-mail: karzan.mahmud@su.edu.krd Tel: 009647504523086
5. Time (in hours) per week	Theory: 2 Practical: 3
6. Office hours	Available 4 hours in a week
7. Course code	
8. Teacher's academic profile	My name is Karzan K Mahmud, and I am teaching staff at Plant Protection department- College of Agricultural Engineering science. I have got BSc. degree in this department in 2008-2009, and then I have taken MSc degree in Sheffield University - UK in 2014. I have studied MSc in Bio-science department- faculty of health and wellbeing. My specialist is Biotechnology in Microbiology. I have published 3 scientific papers during studying MSc and 2 papers during my PhD. studying. Totally, I have published 6 papers so far. Currently I am under Researching in practical stages in some different areas regarding my specialist. Also, I am PhD. holder in Biotechnology in Soil Microbiology at Salahdding University-Erbil.
9. Keywords	Biotechnology, Molecular identification techniques, Gene cloning, Genetic engineering and application of Biotechnology.
10. Course overview:	Basically Biotechnology is the huge activities between technological tools and living organism in such a way that will improve the efficiency of the quality and quantity of the productions. The fundamental aim of studying Biotechnology is to increase the product yield from living organism either by conducting principles of bio-engineering/bio-process technology or by genetically modifying of organisms (GM). Therefore, it is suggested that to be studied due to above beneficial points essentially for those students that are studying in science fields. Additionally, the critical point for studying Biotechnology in plant protection department is to learn perhaps the ways of enhancing the immunities and resistances of plants against pathogens, pests and environmental conditions.
11. Course objective:	<ul style="list-style-type: none"> • Try to make students to be familiar with all most all areas of biotechnology generally. • Attempt to make students to be familiar with all techniques and methods; those are used in Biotechnology theoretically. • Make students to be familiar with GM plant and genetic engineering generally. • Make students to be familiar with using molecular techniques for identification of pathogens and pests generally. .

12. Student's obligation

Students must complete Learning assessments based on lecture material and supplementary lecture-related material. Research and reading is required to complete these. There is a voluntary competition where students must identify, and describe unknown molecular structures and basis of biotechnology.

13. Forms of teaching

The lecturer will use data shown by preparing PowerPoint presentations in which outlines of each lecture will be shown however the details of the lecture will be narrated by the lecturer himself. In some cases, samples will be shown to students to have a close and real idea on the subject.

14. Assessment scheme

Students are evaluated during the semester for the theory part by daily short quizzes which give 5% marks out of 15. One term exam 10 marks each out of 15% in mid-term. The practical part is given 35% marks in total 50% of mid-term marks. Final exam is 50% marks.

15. Student learning outcome:

Students will be learned:

- Basis of biotechnology.
- Molecular identification techniques.
- Concepts of genes, proteins and enzymes.
- Cloning strategy.
- Genetic Engineering
- Gene expression
- Application of Biotechnology.

16. Course Reading List and References:

▪ Key references:

Alberts B, Johnson A, Lewis J, et al. 2008. *Molecular Biology of the Cell* (5th ed.). Garland Science. USA.

Lodish H, Berk A, Zipursky SL, et al. *Molecular Cell Biology*. 4th edition. New York: W. H. Freeman; 2000.

Gerstein A.S. 2004. *Molecular Biology Problem Solver: A Laboratory Guide*. John Wiley & Sons.

Mohanty B.K, Kushner S.R. 2000. Polynucleotide phosphorylase functions both as a 3' → 5' exonuclease and a poly(A) polymerase in *Escherichia coli*; *PNAS*; 97:11966-11971.

Miki B, McHugh S. 2004. Selectable marker genes in transgenic plants: applications, alternatives and biosafety. *Journal of Biotechnology*, 107: 193–232.

Reece RJ. 2000. *Analysis of Genes and Genomes*. John Wiley & Sons, U.K.

Mostaghaci B, Hanifi A, Loretz B, Lehr C-M. 2011. *Nano-Particulate Calcium Phosphate as a Gene Delivery System*. Non-Viral Gene Therapy, Prof. Xubo Yuan (Ed.), ISBN: 978-953-307-538-9. InTech.

Pleyer U, Dannowski H. 2002. Delivery of genes via liposomes to corneal endothelial cells. *Drug News Perspect*, 15(5): 283.

Peters *et al.* (2003) Forward genetics and map-based cloning approaches. *Trends Plant Sci.* 8, 484-491

Lukowitz *et al.* (2000) Positional cloning in *Arabidopsis*. Why it feels good to have a genome initiate working for you. *Plant Physiol.* 123, 795-805

Huang *et al.* (2005) Comparative genomics enabled the isolation of the *R3a* late blight

resistance gene in potato. <i>Plant J.</i> 42, 251-261.	
17. The Topics:	Lecturer's name:- Dr Karzan K Mahmud
1. Introduction of biotechnology	(2 hrs) 3/1/2023
2. Prokaryotic and Eukaryotic cells, and functions of cell organelles	(2 hrs) 10/1/2023
3. Definitions of All Biotechnological Processes	(2 hrs) 17/1/2023
4. Nucleic acid extraction and purification	(2 hrs) 24/1/2023
5. Quantification, Visualizations and Electrophoresis	(2 hrs) 31/1/2023
6. Blotting Techniques	(2hrs) 7/2/2023
7. Molecular Cloning Techniques I	(2 hrs) 14/2/2023
8. Molecular Cloning Techniques II	(2 hrs) 21/2/2023
9. Gene Transfer Techniques I	(2 hrs) 28/2/2023
10. Gene Transfer Techniques II	(2 hrs) 7/3/2023
11. Application of Biotechnology I	(2 hrs) 14/3/2023
12. Application of Biotechnology II	(2 hrs) 28/3/2023
13. Mid-Term Exam 10%	(2 hrs) 7/4/2023
14. Scientific Trip	(2 hrs) 14/4/2023
15. Phase-test Exam	(2 hrs) 21/4/2023
16. Revision	(2 hrs) 28/4/2023
18. Practical Topics (If there is any)	
Introductory + Background of Biotechnology and the distinguish + similarities between Plant and Animal cells	Mr. Muhammed
What are the differences between Prokaryotic and Eukaryotic cells? And what are the functions of cell organelles?	
All definitions of Biotechnology processes and visiting biotechnology lab in other place.	
Methods of (DNA and RNA extractions) and (Purifications and verifications) of	

them.	
Electrophoretic Methods	
Mid course examination + Molecular cloning I	
Molecular Cloning II	
Gene Transfer Techniques	
Scientific trip to other biotechnology labs	
Plant Biotechnology I	
Plant Biotechnology II	
Biotechnology in social welfare	
Second exam & Revision	
<p>19. Examinations: What is biotechnology? Reasons of applications of biotechnology. Why is it important to study this course? How genetic engineering can be carried out? Which gene transfer techniques can be used? What...? Why...? How...? All critical questions</p>	
<p>20. Extra notes: Here the lecturer shall write any note or comment that is not covered in this template and he/she wishes to enrich the course book with his/her valuable remarks.</p>	
<p>21. Peer review پیداچوونہوہی ھاوہل I approve that the course is comprehensive and cover all the aspects of the course.</p> <p>Name: Degree: Specialty: Sign: Date:</p>	