Department of Biology

College of Education - Shaqlawa

Salahaddin University - Erbil

Subject: Molecular Biology I (First Semester)

Course Book – (Year 4)

Lecturer's name: Karzan Kazm Mahmud, PhD

Academic Year: 2023/2024

Course Book

1. Course name	**Molecular Biology – First Semester**
2. Lecturer in charge	**Dr. Karzan Kazm Mahmud**
3. Department/ College	**Biology Department/ Education College - Shaqlawa**
4. Contact	**e-mail: karzan.mahmud@su.edu.krd** **Tel: 009647504523086**
5. Time (in hours) per week	**Theory: 2** **Practical: 2**
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 Microbiology at Salahdding University-Erbil.
9. Keywords	Molecular Biology, Molecular identification techniques, Cell organelles functions, Cell cycle and division, cell membrane function, Transcription….

10. Course overview:

Basically Molecular biology is the huge activities between Molecular tools and living organism in such a way that will improve the efficiency of the quality and quantity of the productions and understanding all molecular activities in the cells. The fundamental aim of studying molecular biology is to know the structures of molecular activities in the cells, and to know the roles of molecular tools in all functions in the living cells. Therefore, it is suggested to be studied due to above beneficial points essentially for those students who are studying in science fields. Additionally, the critical point for studying molecular biology in this department is to learn perhaps the gates of modifications and cloning genes in order to enhance the immunities and resistances of cells generally.

11. Course objective:

- Try to make students to be familiar with all most all areas of molecular biology generally.
- Attempt to make students to be familiar with all techniques and methods; those are used in this area theoretically.
- Make students to be familiar all functions of molecular tools in the cells.
- Make students to be familiar with using molecular techniques for identification of cells generally.

12. Student's obligation

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

13. Forms of teaching

The lecturer will uses data show 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 his self. 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 giving 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 molecular biology.
- Molecular identification techniques.
- Methods of DNA replications
- Methods of molecular extraction generally.
- Concepts of genes, proteins and enzymes.
- DNA, RNA and Protein extraction techniques.
- Cell division and cycle with roles of molecular biology
- Transcriptions and Translation process.

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. *Plant J.* 42, 251-261.

13. The Topics:	**Lecturer's name:- Dr Karzan K Mahmud**
1. Introduction of Molecular biology	(2 hrs) 10/9/2023
2. Molecular Cell biology - Prokaryotic and Eukaryotic cells	(2 hrs) 17/9/2023
3. Molecular Cell biology - Cell Division	(2 hrs) 24/9/2023
4. Molecular Cell biology - Cell Cycle	(2 hrs) 24/9/2023
5. Molecular Cell biology - Cell organelle functions	(2 hrs) 1/10/2023
6. Molecular Cell biology – Cell Membrane and Transport Mechanisms Across The Cell Membrane	(2hrs) 8/10/2023
7. What are Genes and DNA?	(2 hrs) 15/10/2023
8. How can DNA be replicated? I	(2 hrs) 22/10/2023
9. How can DNA be replicated? II	(2 hrs) 29/10/2023
10. Transcription process I	(2 hrs) 7/3/2023
11. Transcription process II	(2 hrs) 5/11/2023
12. Translation process	(2 hrs) 12/11/2023
13. Mid-Term exam or Phase-test Exam	(2 hrs) 19/11/2023
14- Revision of First Semester of Molecular Biology	(2 hrs) 26/11/2023
Practical Topics	
All definitions of Molecular process in the cells DNA Extraction and Purification techniques RNA extraction and Purification techniques Protein Isolation and Purification techniques Electrophoretic Methods Mid-course examination Scientific trip Second exam & Revision	**Dr. Karzan K Mahmud**

19. Examinations: What is molecular biology? What are fundamental of DNA replication? What do you think about S phase in cell cycle Why is it important to study this course? Where are locations of DNA in the cell organelles? Define protein critically. What…? Why…? How…? All critical questions	
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.	
21. Peer review **پێداچوونەوەی هاوەڵ** I approve that the course is comprehensive and cover all the aspects of the course. Name: Degree: Specialty: Sign: Date:	