

Ministry of Higher Education and Scientific research



Department of Biology/General Biology

College of Science

Salahaddin university- Erbil

Subject: Molecular Biology

Course Book – 3rd Year/ General

Lecturer's name (Theory): Dr. Fairuz H. Abdullah

Lecturers' names (Practical): Dr. Muhsin Jamil

Academic Year: 2023-2024

Course Book

1. Course name	Molecular Biology
2. Lecturer in charge	Dr. Fairuz H. Abdullah
3. Department/ College	Department of Biology/ College of Science
4. Contact	e-mail: fairuz.abdullah@su.edu.krd
5. Time (in hours) per week	Theory: 2
6. Office hours	To be Return to the schedule on the office door
7. Course code	

8. Teacher's academic profile

During the first semester of academic year (2023-2024), I taught Zoology (Theory), for 1st stage students of Biology Department (General).

During the first semester of academic year (2022-2023), I taught Zoology (Theory), (First Course) for 1st stage students of Biology Department (Biomedical) and Molecular Biology (Second course) for 3rd stage students of the Biology Department (General).

I also worked as a Member of the Examination Committee for College of Science/ Control in the academic year 2021-2022 second course.

In 2021-2022, I taught Molecular Biology- practical/3rd stage Biology Department, medical- first course & cell biology theory/ 2nd stage-first course/ physics department- medical physics.

I placed myself to Rizgary Teaching Hospital from 24.09.2020 to 24.09.2021. I became Lecturer on 13.01.2020. I have completed PhD. Degree in Biotechnology on 05.12.2019.

In 2015, I applied for studying PhD with IELTS band score 6.5 (Academic) and I was the only applicant with this score. I became PhD student in the specialty of Biotechnology with the rank 4th over the PhD applicants of my department. During the first semester of academic year 2016-2017, I took (Practical Biotechnology), I also taught soil microbiology second course of academic year (2016-2017)

and I was teaching Practical Biotechnology during the first semester of this academic year (4th stage), and teaching practical Molecular Biology (3rd stage) the second semester along with being a PhD student. I also worked as a Member of the Examination Committee for College of Science/ Control in the academic year 2014- 2015.

I graduated from Salahaddin University in 2009 (Ranked 2nd on collage/ 1st on Biology dept.). I worked as assistant biologist during 2009-2010. I worked in the labs of General Microbiology, Environmental Microbiology as well as Microtechniques. In 2013 I got my MSc. degree in Molecular Microbiology and started working as Assistant Lecturer. At first I was teaching Entomology for one year and a half, and then I took the subject of my specialty (Practical Molecular Techniques).

9. Course objective:

This course will give students hands-on experience in modern molecular biology for obtaining and analysing data in population genetics and systematic biology. Following completion of this course the successful student will have theoretical experience in modern molecular biology and evolutionary genetics including molecular systematics, genomics, molecular microbiology, and molecular diagnostic tools. The importance and goals behind this course is to provide the students a clear overview about important subject areas in Molecular Biology and related fields, but at a level that is suitable for undergraduate students.

10. Student's obligation

* **Exam policy:** Student should engage in 1 exam during the course and weekly quizzes. There will be no make-up exams for absent students. By the end of the semester, students must do a final examination regarding this subject.

*Classroom polices:

- 1- **Attendance:** You are strongly encouraged to attend class on a regular basis, as participation is important to your understanding of the material. This is your opportunity to ask questions. You are responsible for obtaining any information you miss due to absence.
- 2- **Lateness:** Lateness to class is disruptive.
- 3- **Electronic devices:** All cell phones should be turned silent at the beginning of class and put away (NOT USED) during the entire class.
- 4- **Talking:** During class please refrain from side conversations. These can be disruptive to your fellow students and your lecturer.
- 5- No Disrespectful to both the lecturer and to your fellow students.
- 6- Every week Quizzes for previous lectures are obligatory and you should be aware of end-of-lecture quizzes also.

11. Forms of teaching

Different forms of teaching will be used to reach the objectives of the course: real-time teaching via white board, student integrations strategy, PowerPoint presentations, figures, flow charts and summarizing the lecture, main topic. Daily quizzes, students' tutorials and assignments will be established and will have their impact on the students' final marks.

12. Assessment scheme		
Component	Date	Marks
Exam		10
Attendance, Weekly Quizzes, & Assignments		5
Total		15
Total Practical Marks		35
Theory Exam Final		50
Total (Theory and Practical exams)		100

13. Student learning outcome:

By the end of this course, students will be able to understand many arguments in the field of Molecular genetics, biochemistry and cell biology. They will have an advanced knowledge to study many clinical problems and genetic disorders. Therefore, they will find a good chance to work in many Governmental and Private sector laboratories. Following completion of this course the successful students will have practical experience in modern molecular techniques used for evolutionary genetics including molecular systematics, genomics, molecular microbiology, separation method for nucleic acids, separation methods for proteins and other bio-molecules, Melting peak characters and hyperchromic character of DNA, and population/landscape genetics.

14. Course Reading List and References:

1. Gerald Karp. 2013. Cell and Molecular Biology, Concepts and Experiments. 7th Edition.
2. Nalini Chandar. 2010. Ippincott's Illustrated Reviews: Cell and Molecular Biology.
3. David Clark. 2015. MOLECULAR BIOLOGY. Southern Illinois University. Elsevier Academic Press.
4. John M. Walker. 2008. Molecular Biomethods Handbook. Second Edition
5. Eberhard Passarge. 2007. Color Atlas of Genetics.
6. Andreas D. Baxevanis. 2001. BIOINFORMATICS, A Practical Guide to the Analysis of Genes and Proteins. SECOND EDITION.

15. The Topics

Weeks	Topics-Theory
Week 1	Introduction to the course, Fundamentals of Molecular Biology
Week 2	Nucleic Acids Structure and DNA Characterisations, & Hyperchromic Property of DNA
Week 3	Melting Temperature, Denaturation and Renaturation
Week 4	Transforming principal of DNA, Historical View -Gliffith Experiment 1928 -Transformation Of DNA In Bacteria
Week 5	Avery, McCarty And Mcloed Experiment 1944 Hershey And Chase Experiment 1952 Frankel-Conrat Experiment
Week 6	DNA Replication in Prokaryotes
Week 7	DNA Replication in Eukaryotes
Week 8	Transcription in Prokaryotes
Week 9	1st Examination
Week 10	Transcription in Eukaryotes
Week 11	Structure and types of RNA, rRNA and tRNA

Week 12	Interference RNA and other RNAs
Week 13	Ribosomes in Prokaryotes & Eukaryotes
	Translation and protein synthesis in Prokaryotes & Eukaryotes
	Gene Expression and control in prokaryotes: 1- Lac Operon 2- Tryptophan Operon Gene Expression and control in Eukaryotes
19. Examinations- Theory:	
1. Compositional:	
Q: Explain with figure the tRNA structure. (5 Marks)	
Q: Count and Describe different types of ribosomes in prokaryotes and Eukaryotes. (5 Marks)	
Q: Explain the reasons behind the followings (answer only 3): (3 Marks each)	
<ul style="list-style-type: none"> The mutation rate of Human Genome is reduces from theoretical one mutation every 10⁶ to about one mutation every 10⁹ Nucleotide Replication. Replication in Eukaryotes occur in multiple loci while in Prokaryotes are single location? Why? 	
2. True or false type of exams:	
Q: Indicate the True-False statements. Students MUST correct the false statements. (7.5 Marks)	
<ul style="list-style-type: none"> The human haploid cell contains about 3x10⁹ nucleotides. T The genome of human being can harbour about 1.5 M genes but actually it has only 25000 genes. T Short tandem repeats (STR) are repetitive sequences of DNA ranging from 7-9 	

nucleotides. F (2-6 nt)

Q: Fill in the Gaps with suitable word(s). (7.5 Marks)

- A gene is a complete sequence region of the genome necessary for generating a functional product.
- The process which the DNA of an ancestral cell is transformed to RNA is called by Transcription.
- The proteins required for the stability of the separated single stranded of DNA during replication process are called by SSBP

One of the important processes through which the genes become regulated is the Methylation of the Cytosine's.