

Ministry of Higher Education and Scientific research



**Department of Biology/General Biology**

**College of Science**

**Salahaddin university- Erbil**

**Subject: Molecular Biology**

**Course Book – 3<sup>rd</sup> Year/ General**

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

**Lecturers' names (Practical): Asst. Lecturer: Abdullah A. Shareef**

**Asst. Lecturer: Mustafa F. Rajab**

**Academic Year: 2022-2023**

# Course Book

<b>1. Course name</b>	<b>Molecular Biology</b>
<b>2. Lecturer in charge</b>	<b>Dr. Fairuz H. Abdullah</b>
<b>3. Department/ College</b>	<b>Department of Biology/Biomedical/College of Science</b>
<b>4. Contact</b>	<b>e-mail: <a href="mailto:fairuz.abdullah@su.edu.krd">fairuz.abdullah@su.edu.krd</a></b>
<b>5. Time (in hours) per week</b>	<b>Theory: 2</b>
<b>6. Office hours</b>	<b>To be Return to the schedule on the office door</b>
<b>7. Course code</b>	
<b>8. Teacher's academic profile</b>	<p>In the second course 2022-2023, I'm teaching Molecular Biology for 3<sup>rd</sup> Year students/ General.</p> <p>In 2022-2023, first course, I taught Zoology theory/ First stage biomedical.</p> <p>I also worked as a Member of the Examination Committee for College of Science/ Control in the academic year 2021-2022 second course.</p> <p>In 2021-2022, I taught Molecular Biology- practical/3<sup>rd</sup> stage Biology Department, medical- first course &amp; cell biology theory/ 2<sup>nd</sup> stage-first course/ physics department- medical physics.</p> <p>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</p>

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 speciality of Biotechnology with the rank 4<sup>th</sup> 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 (4<sup>th</sup> stage), and teaching practical Molecular Biology (3<sup>rd</sup> 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 2<sup>nd</sup> on collage/ 1<sup>st</sup> 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 speciality (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.

## 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 without medical report. 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 for titles, figures, flow charts and summarizing the lecture main topic.

Daily quizzes, students tutorials (15 minutes at least) and assignments will be established and will have their impact on the students final marks.

## 12. Assessment scheme

Component	Date	Marks
<b>Exam</b>		
	<b>15/03/2023</b>	<b>10</b>
<b>Attendance, Weekly Quizzes, &amp; Assignments</b>		<b>5</b>
<b>Total</b>		<b>15</b>
<b>Total Practical Marks</b>		<b>35</b>
<b>Theory Exam Final</b>		<b>50</b>
<b>Total (Theory and Practical exams)</b>		<b>100</b>

### **13. Student learning outcome:**

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. 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**

<b>Weeks</b>	<b>Topics-Theory</b>
<b>Week 1</b> <b>(18.01.2023)</b>	Introduction to the course, Fundamentals of Molecular Biology
<b>Week 2</b> <b>(25.01.2023)</b>	Nucleic Acids Structure and DNA Characterisations, & Hyperchromic Property of DNA
<b>Week 3</b> <b>(01.02.2023)</b>	Melting Temperature, Denaturation and Renaturation
<b>Week 4</b> <b>(08.02.2023)</b>	Transforming principal of DNA, Historical View -Gliffith Experiment 1928 -Transformation Of DNA In Bacteria
<b>Week 5</b> <b>(15.02.2023)</b>	Avery, McCarty And Mcloed Experiment 1944 Hershey And Chase Experiment 1952 Frankel-Conrat Experiment
<b>Week 6</b> <b>(22.02.2023)</b>	DNA Replication in Prokaryotes
<b>Week 7</b> <b>(01.03.2023)</b>	DNA Replication in Eukaryotes
<b>Week 8</b> <b>(08.03.2023)</b>	Transcription in Prokaryotes
<b>Week 9</b> <b>(15.03.2023)</b>	1st <b>Examination</b>
<b>Week 10</b> <b>(29.03.2023)</b>	Transcription in Eukaryotes
<b>Week 11</b> <b>(05.04.2023)</b>	Structure and types of RNA, rRNA and tRNA,

<b>Week 12</b> <b>(12.04.2023)</b>	Interference RNA and other RNAs
<b>Week 13</b> <b>(19.04.2023)</b>	Ribosomes in Prokaryotes & Eukaryotes
<b>Week 14</b> <b>(05.04.2023)</b>	Translation and protein synthesis in Prokaryotes & Eukaryotes
<b>Week 15</b>	Gene Expression and control in prokaryotes: 1- Lac Operon 2- Tryptophan Operon Gene Expression and control in Eukaryotes
<p><b>19. Examinations- Theory:</b></p> <p>1. Compositional:</p> <p>Q: Explain with figure the tRNA structure. (5 Marks)</p> <p>Q: Count and Describe different types of ribosomes in prokaryotes and Eukaryotes. (5 Marks)</p> <p>Q: Explain the reasons behind the followings (answer only 3): (3 Marks each)</p> <ul style="list-style-type: none"> <li>The mutation rate of Human Genome is reduces from theoretical one mutation every 10<sup>6</sup> to about one mutation every 10<sup>9</sup> Nucleotide Replication.</li> <li>Replication in Eukaryotes occur in multiple loci while in Prokaryotes are single location? Why?</li> </ul> <p>2. True or false type of exams:</p> <p>Q: Indicate the True-False statements. Students MUST correct the false statements. (7.5 Marks)</p> <ul style="list-style-type: none"> <li>The human haploid cell contains about 3x10<sup>9</sup> nucleotides. T</li> <li>The genome of human being can harbour about 1.5 M genes but actually it has only 25000 genes. T</li> <li>Short tandem repeats (STR) are repetitive sequences of DNA ranging from 7-9</li> </ul>	



nucleotides. F (2-6 nt)

Q: Fillin 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.