Lahore University of Management Sciences

Molecular Biology (BIO216)

Fall 2023

Instructors	Dr. Muhammad Tariq (MT); Dr. Muhammad Shoaib (MS)
Room No.	9-315A (MT) and 9-429 (MS)
Office Hours	To be decided
Email	m.tariq@lums.edu.pk; mshoaib@lums.edu.pk
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Secretary/Coordinator/TA	To be decided
TA Office Hours	To be decided
Course URL (if any)	lms.lums.edu.pk
Lecture	To be decided
Lab	To be decided

Course Teaching Methodology
• **Teaching Methodology:** All lectures will be in person on campus unless the university does not allow students to come to campus. In the latter case, all lectures will be synchronous via zoom invites, however, students will be guided to supplementary reading material. • **Lecture Details:** There will be no pre-recorded lectures. However, links to related reference material available online from different sources will be provided, if necessary.

COURSE BASICS				
Credit Hours	Three (3)			
LECTURES	Lectures per week	Two (2)	Duration	75 minutes each
Schedule	Tuesdays & Thursdays		Venue	
TUTORIAL	Sessions per week	One (1)	Duration	50 minutes

Course Distribution	
Core	Yes (for undergraduate students majoring or minoring in Biology)
Elective	Yes for all others
Open for Student Category	Biology majors and minors
Close for Student Category	Those not having taken BIO101

COURSE DESCRIPTION
This course provides a comprehensive introduction to molecular biology and is designed for students interested in learning molecular mechanisms which control cellular processes in eukaryotes and prokaryotes. Topics include structure of nucleic acids and proteins, organization of genes, genomes, chromatin and chromosomes, DNA replication, repair, recombination, transcription, mRNA processing, protein synthesis and turnover, control of gene expression, signal transduction pathways, non-coding RNAs, evolution of biopolymers and origin of life.

COURSE PREREQUISITE(S)	
	Introductory Biology (BIO101)

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COURSE OBJECTIVES	
	The objective of this course is to impart foundational knowledge and essential concepts in molecular biology to students.

Learning Outcomes	
	After taking this course students should: ▪ Be knowledgeable about the structure of nucleic acids and proteins, and how genomes are organized in bacteria and eukaryotes ▪ Understand specific roles of different proteins involved in cellular processes such as gene transcription, DNA replication & repair, protein synthesis etc. ▪ Understand mechanisms through which expression of genes is turned regulated in bacteria, viruses and eukaryotes ▪ Be aware of quality control systems that work in concert in order to minimize errors as well as dampen genetic noise

Grading Breakup and Policy
Quiz: 10% (3-5) Assignments/Discussion: 10% Exam-1: 20% Exam-2: 20% Exam-3: 20% Final Examination (Exam-3): 20%

Examination Detail	
Midterm Exam	Yes/No: Yes Combine Separate: Combined Duration: 2 hours Preferred Date: None Exam Specifications: Combination of multiple choice and short answer questions (no exam booklets required)
Final Exam	Yes/No: Yes Combine Separate: Combined Duration: 2 hours Exam Specifications: Combination of multiple choice and short answer questions (no exam booklets required)

Makeup Policy
• Please refer to Student Handbook 2019-20, page 37, article 25, titled “Makeup Policy for Graded Instruments”. • *“In case N-X policy is implemented for an instrument having multiple sub instruments then petitions will not be accepted for that instrument”.*

Code of Conduct
1. Students are required to show up in classes fully prepared for the lecture and ensure that their videos are on and mics are muted in case of online lectures.

2. Quiz will be announced ahead of time, students must ensure their devices are charged and they have a stable internet connection (including smartphones) in case of online lectures.
3. All assessments including quizzes and exams will be timed. Make sure that you are able to start them on time.

COURSE OVERVIEW			
Lecture	**Topics**	**Recommended Readings**	**Instructors**
Lecture #1	Introduction – Biodiversity, Cells & Genomes		MS
Lecture #2-3	Cell Chemistry & Proteins		MS
Lecture #4-7	DNA, Chromatin, Chromosomes, and Genomes		MS
	EXAM-1 (covering lectures 1-7)		
Lecture #8-9	DNA Replication		MS
Lecture #10-11	DNA Damage & Repair		MS
Lecture #12-13	DNA Recombination & Transposition		MS
Lecture #13-14	Transcription – DNA to RNA		MS
Lecture #15-16	Translation – RNA to Protein		MS
	EXAM-2 (covering lectures 8-16)		
Lecture #17	Protein folding and turnover RNA world and Origin of Life		MT
Lecture #18	Control of gene expression-I (general)		MT
Lecture #19	Control of gene expression-II (bacteria)		MT
Lecture #20	Control of gene expression-III (bacteriophage)		MT
Lecture #21-22	Control of gene expression-IV (eukaryotes)		MT
	EXAM-3 (covering lectures 17-22)		
Lecture #23	Post-transcriptional controls		MT
Lecture #24	Non-coding RNAs		MT
Lecture #25	Molecular biology of mitochondria and chloroplasts		MT
Lecture #26	Methods-I (studying cells & proteins)		MT
Lecture #27	Methods-II (manipulating DNA)		MT
	FINAL EXAM		

Textbook(s)/Supplementary Readings

- Molecular Biology of the Cell (Alberts et al. 2015 - 6th Edition).
- Genes IX (Lewin 2008)
- Molecular Biology of the Gene (Watson et al. 2004 – 5th Edition)

Academic Honesty

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A student-teacher relationship is purely based on honesty, integrity and inspiration. Where teacher's role is to make every effort possible to inspire his students about the subject and develop independent thinking and a problem solving attitude about every concept, students are required to uphold values of truth and honesty and eagerness to learn. In this whole learning process honesty, integrity and commitment by students play a major role in their long-term success. It means a student perform all academic work, assignments, exams, quizzes and never gets involved in any unfair activity falling under academic dishonesty like cheating, unauthorized aid of any kind, plagiarism etc. I have also trusted my students, I never invigilate them in exams and trust that they will demonstrate extremely high level of integrity and honesty because if you fail to uphold these core values you will miserably fail in life on every step in the long run. Remember, it's better to fail a small exam rather than cheat and fail in life.

Any instances of academic dishonesty in this course (intentional or unintentional) will be dealt with swiftly and severely. Potential penalties include receiving a failing grade on the assignment in question or in the course overall. For further information, students should make themselves familiar with the relevant section of the LUMS student handbook.

Harassment Policy

SSE, LUMS and particularly this class, is a harassment free zone. There is absolutely zero tolerance for any behavior that is intended, or has the expected result of making anyone uncomfortable and negatively impacts the class environment, or any individual's ability to work to the best of their potential.

In case a differently-abled student requires accommodations for fully participating in the course, students are advised to contact the instructor so that they can be facilitated accordingly.

If you think that you may be a victim of harassment, or if you have observed any harassment occurring in the purview of this class, please reach out and speak to me. If you are a victim, I strongly encourage you to reach out to the Office of Accessibility and Inclusion at oai@lums.edu.pk or the sexual harassment inquiry committee at harassment@lums.edu.pk for any queries, clarifications, or advice. You may choose to file an informal or a formal complaint to put an end of offending behavior. You can find more details regarding the LUMS sexual harassment policy here. To file a complaint, please write to harassment@lums.edu.pk

SSE Council on Equity and Belonging

In addition to LUMS resources, SSE's **Council on Belonging and Equity** is committed to devising ways to provide a safe, inclusive and respectful learning environment for students, faculty and staff. To seek counsel related to any issues, please feel free to approach either a member of the council or email at cbe.sse@lums.edu.pk

Rights and Code of Conduct for Online Teaching

A misuse of online modes of communication is unacceptable. TAs and Faculty will seek consent before the recording of live online lectures or tutorials. Please ensure if you do not wish to be recorded during a session to inform the faculty member. Please also ensure that you prioritize formal means of communication (email, lms) over informal means to communicate with course staff.

Whenever you write an email and submit exams, assignments and all work your file name should follow following instructions in subject of email as well as in file name.

Subject of email: BIO216-Final exam, mid-term exam, quiz number or assignment number

File name: BIO216-LUMS-ID-type of work i.e., exam number, assignments number etc.