

**King Fahd University of Petroleum & Minerals**  
**College of Chemicals and Materials, Bioengineering Department**  
**LS 541: Cellular and Molecular Biology (3-0-3)**  
**Syllabus - Term 25A**

**Catalog Course Description:** Chemical basis of life, the basic unit of life (the cell) in relation with structure and function, photosynthesis, cellular respiration, cell reproduction (mitosis & meiosis), cell cycle regulation. Cell communication, signal transduction, molecular basis of carcinogenesis. Molecular structures and mechanisms involved in the storage, transmission and utilization of genetic information in simple and complex organisms, gene transcription and translation, principles and methodology of recombinant DNA.

**Course Prerequisite:** Graduate Standing

**Co-requisite:** N/A

**Textbook:** Albert, et al., Molecular Biology of the Cell, 7th Ed., W.W. Norton & Company, Inc., 2022.

**Instructor:** Prof. Irshad Ahmad /B7-R125-2 / Phone: 8393 / irshad@kfupm.edu.sa

**Office Hours:** UTR 11:00 A.M.-12:00 P.M and by appointment

**Course Learning Outcomes:**

1. Explain cellular genomes, replication, transcription, translation, and gene expression.
2. Explain intracellular compartments, traffic, cell cycle, signaling, cytoskeleton and cancer.
3. Identify and evaluate resources to learn independently.
4. Conduct thorough and relevant literature surveys using appropriate method/tools.

**Course Topics:**

Week#	Ch.	Topic
1	1	Cells and Genomes
2	2	Chemical basis of life (Cell Chemistry and Bioenergetics)
3	4	DNA, Chromosomes, and Genomes
4	5	DNA Replication, Repair, and Recombination
5	6	How Cells Read the Genome: From DNA to Protein
6	7	Control of Gene Expression
7	Lecture notes	Principles and methodology of recombinant DNA
8	11	Membrane Transport of Small Molecules and the Electrical Properties of Membranes
9	12	Intracellular Compartments and Protein Sorting
10	13	Intracellular Membrane Traffic
11	14	Energy Conversion: Mitochondria and Chloroplasts
12	15	Cell Signaling
13	16	The Cytoskeleton
14	17,18	The Cell Cycle (mitosis & meiosis) and Cell Death
15	20	Cancer

**The Grading Policy:**

Classwork	30%	
Attendance	3%	
Assignments	6%	
Quizzes	6%	
Term Project	15%	
Major Exam I	20%	(Date: 30.09.2025)
Major Exam II	20%	(Date: 04.11.2025)
Final Exam	30%	(TBA by the registrar)

**Important Notes:**

- The students are encouraged to use any AI tool provided they highlight the parts written by such a tool and can answer any questions about it. A proper citation for the exact name and version of the tool should be given.
- Each student must be vigilant about academic integrity at all times.
- Only official excuses obtained from the Deanship of Students Affairs are accepted.
- If a student reaches more than 20% of unexcused absence (10 absences of the 45-lecture class or 7 absences of the 30-lecture class), a DN grade will be issued.
- For every unexcused absence, 0.5 points will be deducted from the attendance marks.
- Excuses for officially authorized absences must be presented no later than one week following the resumption of class attendance.
- No makeup will be accommodated for missed quizzes or exams.
- Late assignments will not be accepted.
- A student caught cheating in any of the assignments will get ZERO in all assignments, and other proper action will be taken that may eventually lead to the transfer of the student to student affairs.
- The instructor reserves the right to modify the course outline and policies mentioned in this syllabus at any time during the semester.
- Refer to the registrar website for the academic calendar and important deadlines:  
<https://registrar.kfupm.edu.sa/academic-calendar/current-semester/>