Lahore University of Management Sciences

BIO101 – Introductory Biology
Fall 2023

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Secretary	
Teaching Assistant (lead)	
TA Office Hours	TBA
Course URL (if any)	

Course Teaching Methodology (Please mention following details in plain text)
• Teaching Methodology: In person lectures. • Lecture details: In person lectures with PowerPoint slides and blackboard usage. Recordings from the previous offering may be available for students. Tutorials with TAs also available throughout the week.

COURSE BASICS				
Credit Hours	Three (03)			
Lecture(s)	TBA	TBA		75 minutes
Recitation (per week)			Duration	
Lab (if any) per week	Session(s) Per Week		Duration	
Tutorial (per week)	TBA (each TA will offer a tutorial at different time)		Duration	50 minutes

COURSE DISTRIBUTION	
Core	Yes (for SSE)
Elective	Yes, for other Schools
Open for Student Category	All students
Closed for Student Category	None

COURSE DESCRIPTION

Introductory biology aims to provide a broad overview of biology as it stands today, exposing students to a variety of topics in modern molecular and cellular biology. The course is divided into five modules:

1. *Macromolecules and Cell Biology:*

We start with an introduction to the molecules of life and how they are organized into a cell, the basic unit of life in all living organisms. Students learn how cells communicate with each other, how they divide, and how they produce and consume energy.

2. *Genes and Development:*

The course then focuses on the organization of genetic material and how various molecular, genetic and biochemical processes underlie the functioning of cells from replicating their genetic material for cell division to specifically producing essential proteins during development.

3. *Omics and Systems Biology:*

This module provides an overview of how modern biology is reliant on generation and analysis of big data and how this data can be utilised for a better understanding of biological systems.

4. Recombinant DNA Technology:

This module covers gene cloning and protein expression and their applications in Biotechnology

5. *Human Diseases and Drug Discovery:*

In the end, we discuss how communicable and non-communicable human diseases are caused and how understanding the molecular mechanisms of these diseases allows us to develop more effective drugs. Manipulating genetic materials is at the heart of advances in life sciences that we see today from biomedical to agricultural sciences. This module also provides an overview of how the genetic makeup of organisms can be manipulated in the laboratory.

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COURSE PREREQUISITE(S)

None.

COURSE OBJECTIVES

The overarching goal of this introductory course is to expose students to basic aspects of modern-day biology. The course is multifaceted and covers a broad range of topics.

LEARNING OUTCOMES

After taking this course students should be knowledgeable about:

- Features of different cell types, viruses, and processes through which genetic information flows
- How cells communicate with other cells and the roles genes, proteins and environment play in this process
- Structure of genes and composition of genomes
- How biological information is stored and retrieved
- Modern approaches for probing informational databases and building phylogenetic trees
- Basic aspects of plant and animal genetics
- How diseases occur and how they can be prevented or cured

GRADING BREAKUP AND POLICY

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Evaluation:

Exam -1	20%
Exam -2	20%
Exam -3	20%
Exam -4	20%
Attendance Quiz	10%
Assignments	10%

EXAMINATION DETAIL	
Midterm Exam	Yes/No: Yes Combine/Separate: Separate Duration: 2 hours Preferred Date: Exam Specifications: MCQs; answer books not required
Final Exam	Yes/No: Yes Combine/Separate: Separate Duration: 2.5 hours Exam Specifications: MCQs; answer books not required

LECTURE SCHEDULE

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DATE	LECTURE TOPICS	INSTRUCTOR	READING MATERIAL
Lecture #	**MODULE-I: Macromolecules and Cell Biology**		
1	Biology: Life	AF	Chapter 1: p2-17
2	Molecules of Life I; Proteins	AF	Chapter 2: p22-51
3	Molecules of Life II; Carbohydrates, Lipids and Nucleic Acids	AF	Chapter 4: p51-66
4	Cell Structure	AF	Chapter 5: p77-118
5	Cell Communication	AF	Chapter 7: p126-140
6	Cell Cycle and Cell Division	AF	Chapter 11: p206-225
7	Generation and utilization of energy by cells	AF	Chapter 9 & 10: p165-200
	EXAM-1 (covering lectures 1-7)		
	MODULE-2: Genes and Development		
8	From DNA to Phenotype I-transcription	MT	Chapter 13: p260-288
9	From DNA to Phenotype II-translation	MT	Chapter 14; p290-300
10	From DNA to Phenotype III-translation	MT	Chapter 14; p290-300
11	Genetics I	MT	TBA
12	Genetics II	MT	TBA
13	Genetics III		
14	Development I	MT	TBA
15	Development II	MT	TBA
	EXAM-2 (covering lectures 8-15)		
	MODULE-3: The World of Omics		
16	DNA & Protein Sequences	SU	Mount: Chapter 1, 2
17	Sequence Comparison	SU	Mount: Chapter 3
18	RNA & Protein Structures	SU	Rastogi: Chapter 1, 2
19	Structure Comparison	SU	Rastogi: Chapter 12
20	Computational Approaches to Structural Modelling	SU	Rastogi: Chapter 13
	MODULE-4: Recombinant DNA and Genome editing		
21	Recombinant DNA Technology -Cloning and Expression	AF	Chapter 18: p374-382
22	Genome Editing CRISPR – Cas9	AF	
	EXAM-3 (covering lectures 16-22)		
	MODULE-5: Human Diseases and Drug Discovery		
24	Nervous system	AF	
	Immune System	AF	Chapter 42: p856-875
25	Human Pathogens (Viruses and Bacteria)	AF	Chapter 26: p525-545

26	Cancer	AF	TBA
27	Drug Development & Delivery	AF	TBA
28	Biotechnology: Stem Cells and Personalized medicine	AF	TBA
	EXAM-4 (covering lectures 24-28)		

Textbook(s)/Supplementary Readings
Life – The Science of Biology (Purves et al 10th Edition) Bioinformatics – Sequence and Genome Analysis (Mount et al, 2nd Edition) Bioinformatics – Methods and Applications (Rastogi et al, 3rd Edition)