BITS PILANI, K K BIRLA GOA CAMPUS

INSTRUCTION DIVISION

First Semester 2024-2025

COURSE HANDOUT (PART II)

4th-Aug-2024

In addition to part-I (General Handout for all courses) printed on page 1 of the timetable book, this portion gives further specific details regarding the course.

Course No. : **BIO F111**
Course Title : **GENERAL BIOLOGY**
Instructor-in-charge : **INDRANI TALUKDAR**
Team of Instructors : **Raviprasad Aduri, Malabika Biswas, Arnab Banerjee, Meenal Kowshik, Kundan Kumar, Sandhya Mehrotra, Sukanta Mondal, Sonal Ayakar**

1. Course Description:

Living systems and their properties; classification of organisms; biochemistry; biochemical pathways operative in organisms; introductory genetics, evolution, ecology and environmental sciences; basic plant and human physiological processes.

2. Scope and Objectives:

The course is aimed to provide a broad introduction to the major principles and topics in biology. The relationship of the living organism with its environment at the molecular level is highlighted, in line with modern research in biological sciences. Effort would be made to relate what is being taught in the classroom with real- world applications, so that the student can appreciate the relevance and interdisciplinary nature of biology. The course offers an opportunity to the students in all disciplines to understand the beautiful working of Nature – *undoubtedly the best architect till date* – and to apply the knowledge gained to solve challenging problems in science and/or engineering.

3. Text Book:

T1. Campbell Essential Biology with Physiology, Fifth Edition (2016), ISBN 9780321967671 by Eric J. Simon, Jean L. Dickey, Kelly A. Hogan, and Jane B. Reece; Pearson Education Inc.

4. Reference Books:

R1: Enger, E.D., Ross, F.C. and David B. Bailey. Concepts in Biology. 13th Edition. Tata McGraw-Hill Publishing Company Ltd. New Delhi, India.

R2: Raven, P H.,Johnson, GB., Losos, J.B.,Singer, SR., Biology , 7th Edition Tata McGraw Hill Ppublishing Company Limited, 2005.

5. Suggested Reading

S1: Starr, Cecie. Biology: Concepts and Applications (6th edition). India: Thomson Brooks/Cole, 2007.

6. Lecture Plan:

Lect.#	Learning Objectives	Topics to be covered	Chap.#	Lecture Instructor
1-2	Introduction to the study of life	Science and the scientific method; the science of biology, levels of biological organization	**1(T1)**	**Raviprasad Aduri**
3-6	Organic chemistry of living things	Building blocks; carbohydrates; proteins, nucleic acids; lipids	**3(T1)**	
7-8	Cell Structure and Function	Cell theory; prokaryotic and eukaryotic cells; cell membrane and membrane-bound organelles; non-membranous organelles;	**4(T1)**	

9-10	Enzymes, co-enzymes and energy	How enzymes speed chemical reactions, co-factors, co-enzymes, enzymatic competitions, inhibition	**5(T1)**	
11	DNA and RNA – The Molecular Basis of Heredity	Central Dogma; Molecular Structures; Duplex DNA & DNA Replication.	**8(T1)**	**Indrani Talukdar**
12-14		Gene Expression: Transcription & Translation, Mutation & Mutagenesis		
15-16	Cell Division – Proliferation and Reproduction	Cell Cycle; The Stages of Mitosis, Abnormal Cell Division: Basis of Oncology	**9(T1)**	
17-18		Introduction; Mechanisms I & II; Crossing over, Nondisjunction; Significance		
19-20	Biochemical Pathways – Photosynthesis	Basics of Photosynthesis; light reactions; Calvin cycle; autotrophs and heterotrophs	**7(T1)**	
21-23	Biochemical Pathways – Cellular Respiration	Cellular respiration – three stages of generating ATPs; process of fermentation, Protein and fat metabolism	**6(T1)**	**Malabika Biswas**
24-27	Patterns of Inheritance	Mendelian genetics – laws of heredity; extensions to Mendel's laws; linkage; other influences on phenotype	**10(T1)**	
28-30	Techniques and Applications of Biotechnology	Introduction; Tools: Vectors & Endonucleases, Gene Cloning & Expression: Illustration (Dolly); Applications: Healthcare; Agriculture & Industry	**16 (R1)**	
31-33	Human Physiology: Material exchange in the body	Role of heart in blood circulation, Pulmonary and Systemic.	**24(T1)**	**Arnab Banerjee**
		Gas Exchange: Respiratory Anatomy, Lung Function;		
		Mechanical and Chemical processing of food & Waste disposal: Digestive System;		
		Kidney structure & function		
34	Nutrition (Food and diet)	Kinds of nutrients & their functions, dietary reference intakes, basal metabolic rate, eating disorders and deficiency diseases, nutrition for fitness and sports	**25(T1)**	
35-36	Body's control mechanisms	Nervous system: Nerve impulse; Events at the synapse & CNS organization.	**26(T1)**	
		Endocrine System; Sensory input (Chem.+ Ear), Sensory input (Eye, Skin); Output Coordination		
37-38	Body's protection mechanism	Immune System; Defense Mechanisms	**26(T1)**	
		Humoral & Cell-mediated Immunity		
		Vaccines, Blood typing, AIDS		
39-40	Human Reproduction, Sex and Sexuality; Human development	Human sexuality and determinants; gametogenesis; male and female reproductive systems – hormonal controls; pregnancy and early human development; contraception; abortion; changes in sexual function with age	**27(T1)**	

7. Portions for self-study:
Will be announced in class and Moodle.

8. Evaluation Scheme:

**** 20% of the top 5 highest score average will be considered as the minimum cut-off to pass the course****

#	Evaluation component	Duration	Weight	Date and Time	Remarks
1	Attendance		5%	Continuous	
1	Quiz 1 (online)*	20 min	15 %	13/9/2024, Friday, 6 pm onwards	Closed Book
2	Mid Term Test	90 min	25 %	4/10/2024, Friday 4pm-5:30 pm	Closed book
3	Quiz 2 (online)*	20 min	15 %	13/11/2024, Wed, 6 pm onwards	Closed book
4	Comprehensive Examination	3 hrs	40 %	05/12/24 (AN) Thursday, 2-5 pm	Closed book/Open Book**

* The quizzes will be for duration of 20-30 min. The precise timings for each batch will be announced in the class/moodle.
** One may bring original class notes and (text and/or reference) book(s).

9. Chamber consultation hours:
Will be announced in the class.

10. Make-up Policy:
You may apply for make-up only if you miss any of the evaluation components due to serious medical emergency for which a valid proof would have to be produced. However, the final decision would rest with the instructor. Make-up for quizzes will not be given. Refer to Clause 4.07 of BITS *Academic Regulations* for more details.

11. Notices: All course announcements will be through Moodle/in class.

Instructor-in-charge,
BIO F111