



### SECOND SEMESTER 2022-2023 Course Handout - Part II

Date: 13-03-2023

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: PRAGYA KOMAL**

**Instructors (Lectures):** Pragya Komal, Shuvadeep Maity, Kirtimaan Syal

**Instructors (Tutorials):** Ruchi Jain Dey, Kumar Pranav Narayan, NagaMohan Kommu, Shuvadeep Maity, Pragya Komal, Supratim Ghosh, Amartya Sanyal, Kirtimaan Syal, P.Sankar Ganesh

**Course Description:** This is an introductory/foundation-level course where students are expected to learn about living systems and their properties, major biological compounds, and basic biochemical and physiological processes. Students will also get introduced to genetics and recombinant DNA technology and their applications in daily life. While designing the course, care has been taken to relate the principles of biology with other science and engineering disciplines wherever possible.

**Scope and Objective:** Some students question the need for a course in biology, especially when their area of study is not related to biology (or science). However, it is becoming increasingly important to understand the nature of science and fundamental biological concepts for any person, regardless of his or her occupation. In this context, this course has been intended to impart knowledge on the biological system with respect to nature, behavior, and functioning of the cell. Further, this course has also been designed to make the student understand the intricate relationship that living organisms have with their environment at the molecular level, so that impact of modern biological research can be understood and appreciated by them. It is expected that at the end of this course, students will become aware of the influence of biology in almost every aspect of their lives.

**Intended Learning Outcomes:** After successful completion of this course, students will be able to, but not limited to:

- ❖ Comprehend various aspects of biology
- ❖ Understand biomolecules and enzymes
- ❖ Outline cell structure and function
- ❖ Appreciate biochemical pathways
- ❖ Explain the molecular basis of heredity and genetic diversity
- ❖ Apply biotechnology to some aspects of daily life
- ❖ Compare and contrast material exchanges in the human body
- ❖ Examine the human body's control mechanism, including reproduction

**Text Book: TB:** Simon, E.J. et. al. Campbell Essential Biology with Physiology (5th edition). Noida: Pearson India Education Services Pvt. Ltd., 2016.

**Reference Books: RB1:** Eldon D. Enger, Frederick C. Ross and David B. Bailey, Concepts in Biology, 14th Edition (BITS Pilani, Custom Edition) Tata McGraw Hill Publishing Company Limited, 2012.

**RB2:** Peter H. Raven, George B. Johnson, Jonathan B. Losos, Susan R. Singer Biology, 7th Edition. WBC McGraw Hill, 2005.

**RB2:** C. Starr, Biology: Concept and application, 6th Edition, Thomson Learning.

**Course Plan:**

Lecture No.	Learning Objectives	Topics to be covered	Chapter No.
1	Getting introduced to the course	Orientation to the course content; the scientific method; properties of life, Science, and Theories in Science and Classification	TB:1
2-5	Organic chemistry of living things	Building blocks; proteins (including enzymes); carbohydrates; lipids	TB:3, 5
6-8	Cell Structure and Function	Cell theory; prokaryotic and eukaryotic cells; a brief overview of cellular organelles; membrane transport mechanisms	TB:4
9-10	Obtaining nutrition: cellular level	Biochemical Pathways - Cellular respiration: three stages of generating ATPs; the process of fermentation	TB:6
11-12	Borrowing energy from nature: photosynthetic reactions	Biochemical Pathways - Photosynthesis: light reactions, Calvin cycle; autotrophs and heterotrophs	TB:7
13-16	Structure and function of DNA, and viruses	DNA structure and its discovery, DNA replication; the genetic code; transcription; eukaryotic RNA processing; translation; mutations; viruses	TB:10
17-19	Genetic regulation and the process of cloning	How and why genes are controlled; cloning plants and animals; stem cells	TB:11 (pg.196-208)
20-21	Biotechnology and its Applications	Techniques of DNA manipulation; GMOs; DNA Fingerprinting; bioinformatics; forensic science; biotechnology ethics	TB:12
22-25	Cell Division - Proliferation and Reproduction	Cell cycle and Mitosis; stages of mitosis; cancer and cell cycle; Meiosis - stages and generation of genetic diversity; chromosomal abnormalities; the genetic basis of cancer	TB:8 and 11 (pg.209-212)
26-28	Patterns of Inheritance	Mendelian genetics - laws of heredity; extensions to Mendel; other influences on phenotype	TB:9 RB1: 10
29-30	Genetic diversity within species	Speciation; Gene pool concept; Hardy-Weinberg equilibrium and its applications	RB1: 12.1-12.4, 13.1-13.5, 13.9
31-34	Unifying Concepts of Animal Structure and Function	Regulating internal body environment; Human circulatory, respiratory, digestive, and excretory systems	TB: 13,14,15
35-36	Nervous System	Organization of the nervous system; nerve signal transmission; central and peripheral nervous systems	TB:19
37-38	Body's defense strategies	Innate immunity; lymphatic system; adaptive immunity	TB:16
39-40	Hormonal system	Different hormones, their production sites, and modes of action	TB:17
41-42	Human reproduction and embryonic development	Human Reproduction, Sex, and Sexuality - gametogenesis; male and female reproductive systems – hormonal controls; pregnancy and early human development	TB:18 RB1: 27

**Note:** A few topics may be given for self-study if deemed appropriate by the course team.

**Evaluation Scheme:**

Evaluation component	Duration	Weightage % (Marks)	Date and Time	Nature of the Component
Mid-Semester Examination	1.5 hours	30% (60M)	02-05-2023 (3:30 – 5:00 PM)	Closed Book
Announced Quizzes (Total of 3; Best 2 out of 3 quizzes will be considered for evaluation)	Diverse	30% (60M)	TBA	Closed Book
Comprehensive Examination	3 hours	40% (80M)	10-07-2023 (FN)	Closed Book (20%) + Open Book (20%)

**Note:** For Open Book component of Comprehensive examination - Only original copies of textbook will be allowed (no printout or Xerox copies of the textbook will be permitted).

**Chamber Consultation Hour:** To be announced by the respective lecture/tutorial section instructor.

**Grading Policy:** The award of grades will be guided in general by the histogram of marks. Decisions on borderline cases will be based on the individual's sincerity, the student's regularity in attending classes, and the section instructor's assessment of the student. If a student is absent from himself/herself in any of the components (listed in the Evaluation Scheme above) entirely, his/her performance in the course may be reported as 'NC' (Not Cleared).

**Make-up Policy:** **No make-up would be considered for Announced Quizzes under any circumstances.** Make-up for other evaluation components may be given only in genuine (medical emergency) cases of absence and only after consulting the team of faculty members in the course. If the absence is anticipated before the examination, prior permission from the Instructor-in-charge is necessary. Also, refer to Clause 4.07 of BITS Academic Regulations for more details.

**Notices:** All notices/ announcements regarding this course shall be displayed in Course Management System (CMS).

**Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester, and no type of academic dishonesty is acceptable.

**Pragya Komal  
Instructor In-charge  
BIO F111**