



SECOND SEMESTER 2023-2024 Course Handout - Part II

Date: 09.1.2024

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: K. N. MOHAN

Instructors (Lectures): K. N. Mohan, Pragya Komal, Amartya Sanyal, Nishith Gupta

Instructors (Tutorials): Amartya Sanyal, Debashree Bandyopadhyay, Kavi Devaraj, Nisith Kumar Gupta, Sankar Ganesh, Pragya Komal, Ruchi Jain, Shuvadeep Maity, Suprati, Ghosh

Course Description: This is an introductory/ foundation level course, where students are expected to learn about living systems and their properties, major biological compounds, 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, through this course it has been intended to impart knowledge on biological system with respect to nature, behavior and functioning of the cell. Further, this course has also been designed to make the student understand 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 would 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 molecular basis of heredity and genetic diversity
- ❖ Apply biotechnology to some aspects of daily life
- ❖ Compare and contrast material exchanges in human body
- ❖ Examine 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 RB1: 1 Class Notes
2-5	Organic chemistry of living things and nutrition	Building blocks; proteins (including enzymes); carbohydrates; lipids; nucleic acids; Basic concepts of nutrition	TB:3, 5 RB1: 3, 5 Class Notes
6-8	Cell Structure and Function	Cell theory; prokaryotic and eukaryotic cells; brief overview of cellular organelles; membrane transport mechanisms	TB:4 RB: 4 Class Notes
9-10	Bioenergetics; Respiration: Harnessing biochemical energy	Biochemical Pathways - Cellular respiration: three stages of generating ATPs; process of fermentation	TB:6 RB: 6 Class Notes
11	Bioenergetics; Photosynthesis: Obtaining energy from sunlight and conversion to biochemical energy	Biochemical Pathways - Photosynthesis: light reactions, Calvin cycle; autotrophs and heterotrophs	TB:7 RB: 7 Class Notes
12-15	Cellular functions at Molecular level (DNA as genetic material and expression of genes)	DNA structure and its discovery, DNA replication; the genetic code; transcription; eukaryotic RNA processing; translation; mutations; viruses	TB:10 RB: 8 Class Notes
16-17	Controlling the cellular functions (Genetic regulation)	How and why genes are controlled?	TB:11 RB: 11.3 - 11.5 Class Notes
18	The process of cloning organisms	Cloning plants and animals; stem cells	TB:11 RB: 11.3 - 11.5 Class Notes
19-20	Biotechnology and its Applications	Techniques of DNA manipulation; GMOs; DNA Fingerprinting; bioinformatics; forensic science; biotechnology ethics	TB:12 RB: 11.1 – 11.2
21-24	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:8,11 RB: 9 Class Notes
25-27	Patterns of Inheritance	Mendelian genetics - laws of heredity; extensions to Mendel; other influences on phenotype	TB:9 RB1: 10 Class Notes
28-29	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 Class Notes
30-33	Unifying Concepts of Animal Structure and Function	Regulating internal body environment; Human circulatory, respiratory, digestive (including nutritional requirements) and excretory systems	TB: 13,14,15 RB1: 24, 25 Class Notes
34-35	Nervous System	Organization of the nervous system; nerve signal transmission; central and peripheral nervous systems	TB:19 RB1: 26.1-26.2 Class Notes
36-37	Body's defense strategies	Innate immunity; lymphatic system; adaptive immunity	TB:16 RB1: 26.7 Class Notes
38	Hormonal system	Different hormones, their production sites, and modes of action	TB:17 RB1: 26.3
39-40	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 Class Notes

Note: A few topics may be given for self-study, if deemed appropriate by the course team. These topics may also be used for evaluation.

Evaluation Scheme:

Evaluation component	Duration	Weightage % (Marks)	Date and Time	Nature of the Component
Mid-Semester Examination	1.5 hours	25% (75M)	12/03 - 2.00 - 3.30PM	Closed Book
Announced Quizzes (Total of 3; Best 2 out of 3 quizzes will be considered for evaluation)	Diverse	30% (90M)	TBA	Closed Book
Comprehensive Examination	3 hours	35% (105M)	08/05 AN	Closed Book (15%) + Open Book (20%)
End of the Class Evaluation	Vary	10% (30M)	TBA	1 M every day (for 30 classes) *

*** Question will be asked at the end of the lecture (from that lecture itself). Student who did not attend lecture will not be eligible for giving the response, and will not get marks.**

Questions for evaluation: Objective and descriptive questions won't be limited to the textbook but from the content taught (e.g. Class notes).

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

Grading Policy: Award of grades will be guided in general by the histogram of marks. Decision on border line cases will be taken based on individual's sincerity, student's regularity in attending classes, and the section instructor's assessment of the student. If a student is completely absent for any one of the components (listed in the Evaluation Scheme above), his/her performance in the course may be reported as 'NC' (Not Cleared).

Make-up Policy: No make-up would be considered for 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. The campus doctor's opinion is crucial in this process. If the absence is anticipated, before the examination, prior permission of the Instructor-in-charge is necessary. Request for make-up should reach the Instructor-in-charge at the earliest. 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.

Instructor In-charge
BIO F111