Second Semester 2020-21

Course Handout (Part II)

Date: 18 January 2021

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 Number : **BIO F111**
Course Title : **GENERAL BIOLOGY**

Note: This is a special offering for the backlog students.

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1. Course Description:

Living systems and their properties; classification of organisms; biochemistry and cell biology; primary biochemical/metabolic pathways; introductory genetics; biotechnology and its applications; basic human physiological processes.

2. Scope and Objective of the Course:

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. By the end of the course, the student would have gained an overall understanding of the essential aspects of biology – both as a basic science and as a branch with wide-ranging applications in industry, medicine and human health. It is also expected that using the acquired knowledge, he/she would be able to devise/suggest strategies to solve some of the imminent problems faced by mankind and the world at large.

3. Textbook:

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

4. Reference Books:

RB1: Enger, E.D., Ross, F.C. and David B. Bailey. Concepts in Biology (14th edition, BITS-Pilani Custom Edition 2012). New Delhi: Tata McGraw-Hill Publishing Company Ltd., 2012.
RB2: Raven, P.H., *et. al.* Biology (9th edition). Singapore: McGraw-Hill Publishing Company Ltd., 2012.
RB3: Starr, Cecie. Biology: Concepts and Applications (6th edition). India: Thomson Brooks/Cole, 2007.

5. Course Plan:

*Unless specified otherwise, the numbers correspond to chapters from the textbook

Lect. #	Learning Objectives	Topics to be covered	Chap./ Ref #*	Learning Outcomes
1	Getting introduced to the course	Orientation to the course content; the scientific method; properties of life	1, 4	Get the initial big picture about studying biology and aspects of bio-engineering
2-3	Classification and characteristics of life forms	Kingdoms of life and examples; viruses	10+ RB1: 20	Develop an appreciation for the diversity of life around us
4-5	Organic chemistry of living things	Building blocks; carbohydrates; proteins (including enzymes); nucleic acids; lipids	3, 5	Differentiate between structure and properties of biological macromolecules
6-7	Cell Structure and Function	Cell theory; prokaryotic and eukaryotic cells; brief overview of cellular organelles; membrane transport mechanisms	4	Associate organelles with their cellular functions
8-9	Obtaining nutrition: cellular level	Biochemical Pathways – Cellular respiration: three stages of generating ATPs; process of fermentation	6	Examine the steps the cells use to derive energy from different biomolecule classes
10-11	Borrowing energy from nature: photosynthetic reactions	Biochemical Pathways – Photosynthesis: light reactions, Calvin cycle; autotrophs and heterotrophs	7	Examine the steps the plant cells employ to synthesize sugars using sunlight
12-14	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	8	Comprehend the types of cell division and the underlying control checkpoints; compare the differing mechanics in cancer cells
15-17	Patterns of Inheritance	Mendelian genetics – laws of heredity; extensions to Mendel; other influences on phenotype	9+ RB1: 10	Apply the famous Mendelian laws to solve problems in heredity

18	Nucleic Acid Structure	DNA structure and it's discovery	10	Appreciating the process to discovery of DNA
19-22	DNA and RNA – Function	Replication; RNA and protein synthesis : transcription and translation; mutations	10	Analyze in detail the processes associated with the Central Dogma of Biology
23-25	Genetic regulation and the process of cloning	How and why genes are controlled; cloning plants and animals; stem cells ; the genetic basis of cancer	11	Understand the importance of regulation of gene expression
26-29	Biotechnology and its Applications	Techniques of DNA manipulation; GMOs; DNA Fingerprinting; bioinformatics; forensic science; biotechnology ethics	12	Critique the use of biotechnology tools for societal benefit
30-32	Unifying Concepts of Animal Structure and Function	Regulating internal body environment; Human circulatory, respiratory, digestive and excretory systems	13, 14, 15	Learn about the perfect control mechanisms that ensure homeostasis in the human body
33-35	Nervous System	Organization of the nervous system; nerve signal transmission; central and peripheral nervous systems	19	Understand how life-sustaining messages get transmitted in the human body via electrical signals
36-37	Body's defense strategies	Innate immunity; lymphatic system; adaptive immunity	16	Compare the types of defense mechanisms operating in the body when faced by diseases
38	Hormonal system	Different hormones, their production sites and modes of action	17	Understand and appreciate how life-sustaining messages get transmitted in the human body via chemical signals

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	18+ RB1: 27	Develop a scientific awareness about reproductive health

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

6. Evaluation Scheme:

#	Evaluation component	Duration	Weightage %	Date and Time	Nature of Component
1	Mid-semester Test	90 min	30%	TBA	Closed-book type
2	Course Quizzes (Two)	40 min	25%	**Quiz 1** (TBA) and **Quiz 2** (TBA)	Closed-book type
3	Class Assignments and class Participation	Variable	10%	TBA	Take home and in class Assignments
4	Comprehensive Examination	2 hours	35%	TBA	Open-book type

7. Academic Conduct Policy:

It is expected that all students follow the highest standard of academic practice when participating in any evaluation component. Plagiarism material of any sort in evaluation components will dealt strictly and any such misconduct in this line will likely lead to awarding of no marks for such evaluation component. Having a zero-tolerance for academic dishonesty, any case of misconduct, however minor, will be dealt appropriately.

8. Grading Policy:

Award of grades would be guided by the histogram of marks and course average. If a student absents himself/herself in any component (listed in the Evaluation Scheme), his/her performance in the course may be reported as 'NC' (Not Cleared).

9. Make-up Policy:

If a student misses any of the evaluation components due to a genuine reason (serious medical causes leading to hospitalization, personal/family emergencies) there exists a provision to apply for make-up*. **Prior permission must be taken from the Instructor-in-Charge, before applying**. The decision to grant make-up or not is taken by the instructor team and shall be final.

10. Instructor Consultation: The instructors will announce their contact hour in the class.

11. Course Notices:

Primarily, announcements regarding the course will be made in the lecture and tutorial classes. Certain others notices will be communicated through Nalanda/Email.

(Instructor-in-Charge, BIO F111)