Birla Institute of Technology and Science, Pilani

Hyderabad Campus

FIRST SEMESTER 2019-2020

Course Handout (Part II) for BIO F111 (General Biology)

Date: 01.08.2019

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**

Instructor In-charge : **GIREESHA T. MOHANNATH**

Instructors: Ramakrishna Vadrevu, Jayati Ray Dutta, Sridev Mohapatra, Debashree Bandyopadhyay, Vivek Sharma, Trinath Jamma, Piyush Khandelia and Gireesha T. Mohannath

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 : **T:** 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.

Reference Books : **R1:** Peter H. Raven, George B. Johnson, Jonathan B. Losos, Susan R. Singer Biology, 7th Edition. WBC McGraw Hill, 2005.
R2: C. Starr, Biology: Concept and application, 6th Edition, Thomson Learning.

Suggested Reading : **S1:** Campbell, N.A., Reece J.B., Biology, 7th Edition, Pearson Education Inc, 2009. **S2:** Campbell, N.A., *et. al.* Essential Biology with Physiology, 2nd Edition, Pearson Education Inc, 2009.

Course Plan:

Lecture Number	*Learning objectives*	*Topics to be covered*	*Reference Chapter in text book*
1	Introduction	Introduction to biology and its importance to daily life	1.4
2	Chemistry of life: Organic molecules Molecules of life	Organic Chemistry, Carbohydrates and lipids	3
3 4		Proteins and nucleic acids	
5	Cell structure and function	Cell theory, cell membrane and transport in cells	4
6		Membranous organelles	
7		Non-membranous organelles Nuclear components Major cell types	
8	Enzymes Coenzymes Energy	Nomenclature Bio-catalysis: Hypotheses	5
9		Environmental factors Co-enzymes Enzyme activation and inhibition	
10	Biochemical pathways	Glycolysis TCA cycle	6
11		Electron Transport System ATP calculation	
12		Fermentation Protein and fat metabolism	
13		Photosynthesis	7
14	Taxonomy	Classification and evolution of organisms	20
15		Brief survey of domains Acellular infectious particles	
16	DNA & RNA: The molecular basis of heredity	Central Dogma Molecular structure Duplex DNA and its replication	8
17		Gene expression: Transcription and translation	
18		Mutation and mutagenesis	
19	Applications of biotechnology	Polymerase chain reaction DNA fingerprinting	11
20		DNA sequencing Human genome project	
21		Genetic modification of organisms Cloning of organisms: Illustration (Dolly), Stem cells, Biotechnology & Ethics	
22	Cell division: Mitosis: Body cell division Meiosis: Sex cell formation	Cell cycle: Stages of mitosis	9
23		Abnormal cell division: Basis of oncology	
24		Introduction to Meiosis I and II & crossing over	
25		Nondisjunction Sex determination Comparison of mitosis and meiosis	

26	Mendelian genetics: Concepts and problems	Inheritance patterns and laws	10
27		Multiple allelism	
28		Sex linked inheritance Pleiotropy	
29		Polygenic inheritance and environmental influences	
30	Genetic diversity within species	Speciation Gene pool concept	12.1 - 12.4 13.1 - 13.5 & 13.9
31		Hardy-Weinberg equilibrium and its applications	
32	Material exchanges in the human body	Cardiovascular system: Blood, blood vessels, heart and lymphatic system	24
33		Respiratory system	
34		Obtaining nutrition: Mechanical and Chemical processing of food	
35		Waste Disposal: Kidney structure & function	
36	Body's control mechanism	Nervous system: Nerve impulse, events at the synapse and organization of nervous system	26
37 38		Endocrine system Sensory input (taste, smell, vision, hearing & touch)	
39		Output coordination (muscle contraction) Immune system and defense mechanisms	
40		Acquired and cell-mediated immune responses Blood typing and AIDS	
41	Sex and reproduction	Chromosomal determination of sex Male and female fetal development	27
42		Hormonal control of fertility Fertilization, pregnancy and contraception	

Self-study: Nutrition – Food and Diet: Chapter 25 in the textbook.
These portions will be included in evaluation components such as Midsemester and Comprehensive exams etc.

Evaluation Scheme:

Evaluation component	***Duration***	***% (Marks)***	***Date and time***	***Nature of the Component***
Mid Semester Examination	1.5 Hrs	30 (90)	28/09/2019 1.30-3.00 PM	Closed Book
Test/ quiz* (total of 4)	Diverse	30 (90)	Will be announced later	Closed Book
Comprehensive examination	3 Hrs	40 (120)	03/12/2019 9.00AM-12:00 PM	Closed Book (20% & Open Book (20%)

*Test/ Quiz will be conducted during tutorial hours.

Chamber Consultation Hour: To be announced by the respective 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.

Make-up Policy: Make-up for Mid semester examination will be given only in genuine (medical emergency) cases of absence. 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. Make-up for tutorial/ class tests/ quizzes are not given. 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.

Gireesha T. Mohannath
Instructor In-charge
BIO F111