Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2018 – 2019

COURSE HANDOUT (PART II)

Date: 07.01.2019

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 : **P. SANKAR GANESH**

Instructors : Debashree. B, K. Pranav Narayan, Naga Mohan. K, Piyush Khandelia, Pragya Komal, Ruchi Jain Dey, Suman Kapur, P. Sankar Ganesh

Course Description : This is an introductory/ foundation level course, where students would 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 is intended to impart knowledge on biological system with respect to nature, behavior and functioning of the cell. Further, this course is also 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 Chemistry, Carbohydrates and lipids	3
3	Organic molecules Molecules of life	Proteins and nucleic acids	
4	Cell structure and function	Cell theory, cell membrane and transport in cells	4
5		Membranous organelles	
6		Non-membranous organelles Nuclear components Major cell types	
7	Enzymes Coenzymes Energy	Nomenclature Bio-catalysis: Hypotheses	5
8		Environmental factors Co-enzymes Enzyme activation and inhibition	
9	Biochemical pathways	Glycolysis TCA cycle	6
10		Electron Transport System ATP calculation	
11		Fermentation Protein and fat metabolism	
12		Photosynthesis	7
13	Taxonomy	Classification and evolution of organisms	20
14		Brief survey of domains Acellular infectious particles	
15	DNA & RNA:	Central Dogma Molecular structure Duplex DNA and its replication	8
16	The molecular basis of heredity	Gene expression: Transcription and translation	
17		Mutation and mutagenesis	
18	Applications of biotechnology	Polymerase chain reaction DNA fingerprinting	11
19		DNA sequencing Human genome project	
20		Genetic modification of organisms Cloning of organisms: Illustration (Dolly), Stem cells, Biotechnology & Ethics	
21	Cell division: Mitosis: Body cell division Meiosis: Sex cell formation	Cell cycle: Stages of mitosis	9
22		Abnormal cell division: Basis of oncology	
23		Introduction to Meiosis I and II & crossing over	
24		Nondisjunction Sex determination Comparison of mitosis and meiosis	

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

Self-study: Nutrition – Food and Diet: Chapter 25 in the text book.
These portions will be included in evaluation components such as Midsem 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)	12/3/2019 1.30-3.00 PM	Closed Book
Test/ quiz*	Diverse	30 (90)	Continuous Evaluation	Closed Book
Comprehensive examination	3 Hrs	40 (120)	04/05/2019 9.00AM-12:00 PM	Closed Book & Open Book

*Test/ Quiz will be conducted in all tutorial hours and in some lecture 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.

P. Sankar Ganesh
Instructor In-charge
BIO F111