

**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI**  
**HYDERABAD CAMPUS**  
**INSTRUCTION DIVISION, SECOND SEMESTER 2012-2013**  
Course Handout

Date: 08-01-2013

**Course number** : **BIO F111**  
**Course title** : **General Biology**  
**Instructor-in-charge** : SUMAN KAPUR  
**Team of instructors** : Vidya Rajesh, Debashree Bandyopadhyay, Naga Mohan, Sankar Ganesh, Sridev Mohapatra,

**Course description** :

Living System and their properties, major biological compounds, basic biochemical and physiological processes, introduction to genetics and recombinant DNA technology.

**Scope and objectives** :

The course is aimed at providing the introduction of biological system with respect to nature, behavior and functioning of the cell. The intricate relationship of the living organism with its environment at the molecular level is highlighted so that the impact of the modern biological researches can be understood and appreciated.

**Text book** :

**T1:** Eldon D. Enger, Frederick C. Ross and David B. Bailey, **Concepts in Biology**, 13<sup>th</sup> Edition (BITS Pilani Custom Edition) Tata McGraw Hill Publishing Company Limited, 2010.

**Reference books** :

**R1:** Peter H. Raven, George B. Johnson, Jonathan B. Losos, Susan R. Singer **Biology**, 7<sup>th</sup> Edition. WBC McGraw Hill, 2005.

**R2:** C. Starr, **Biology: Concept and application**, 6<sup>th</sup> Edition, Thomson Learning.

**Suggested reading** :

**S1:** Campbell, N.A., Reece J.B., **Biology**, 7<sup>th</sup> Edition, Pearson Education Inc, 2009.

**S2:** Campbell, N.A., *et. al.* **Essential Biology with Physiology**, 2<sup>nd</sup> Edition Pearson Education Inc, 2009.

**Course plan:**

<b>Lecture number</b>	<b>Learning objectives</b>	<b>Topics to be covered</b>	<b>Reference Chap/Sec (Books)</b>
1-2	Introduction	Brief introduction to all aspects of biology (Section 1.4 onwards of T-1)	1 (T1) 1 (R2)
3	The chemistry of life bio-molecules	Carbohydrate and lipids	3 (T1)
4		Proteins and nucleic acids	3 (T1)
5	Cell structure and functions	Cell theory, cell membrane and transport	4 (T1)
6		Membranous organelles	4 (T1)
7		Non-membranous organelles	4 (T1)
8		Nuclear components and major cell types and viruses	4, 20 (T1)
9	Enzymes	Nomenclature Bio-catalysis: Hypotheses	5 (T1)
10		Environmental factors, co-enzymes, enzyme activation and inhibition	5 (T1)
11	Biochemical pathways	Introduction Cellular respiration: Glycolysis	6 (T1)
12		TCA cycle, ETS, ATP calculation and fermentation	6 (T1)
13		Protein and fat metabolism, Photosynthesis	6 (T1) 7 (T1)
14		Photosynthesis continued: C <sub>4</sub> Pathway	7 (T1)
15	DNA & RNA: Structure and function relationship	Central Dogma, molecular structures, duplex DNA and DNA replication.	14,15 (R1)
16		Gene expression: Transcription and translation	14,15 (R1)
17		Mutation and mutagenesis, Introduction to r-DNA	8 (T1) (8.6)
18	Recombinant DNA technology	Introduction Tools: Vectors and endonucleases	16 (R1)
19		Gene cloning and expression: Illustration (Dolly)	16, 19 (R1)
20		Applications: Healthcare, agriculture and industry	16 (R1)

Lecture number	Learning objectives	Topics to be covered	Reference Chapter (Books)
21	Cell division: Mitosis (Cell copying process)	Cell cycle: The stages of mitosis	9(T1)
22		Abnormal cell division: Basis of oncology	9 (T1)
23	Cell division: Meiosis (Sex cell formation)	Introduction Mechanisms I & II and crossing over	9 (T1)
24		Nondisjunction, sex determination and comparison of mitosis & meiosis	9 (T1)
25-26	Mendelian genetics (Concepts and problems)	Introduction Inheritance patterns and laws	10 (T1)
		Multiple allelism	10 (T1)
		Sex linked inheritance	
		Pleiotropy, polygenic inheritance and Environmental Influence	10 (T1)
27-28	Genetic diversity within species	Speciation, gene pool concept, Hardy-Weinberg equilibrium and its applications	12.1 to 12.4 13.1 to 13.5 & 13.9 (T1)
29	Material exchange in the body	Basic principle Blood circulation: Pulmonary & Systemic Nature of blood and role of heart	24(T1)
30		Gas exchange: Respiratory anatomy and lung function Mechanical processing of food	24 (T1)
		Chemical processing of food and waste disposal: Digestive system Kidney structure & function	24 (T1)
31-32	Nutrition (Food and diet)	Kinds of nutrients & their functions, dietary reference intakes, basal metabolic rate, eating disorders and deficiency diseases, nutrition for fitness and sports	25 (T1)
33	Body's control mechanism - I	Nervous system: Nerve impulse, events at the synapse and CNS organization	26(T1)
34-35		Endocrine system, sensory input (Chem & Ear), sensory input (Eye & skin) and output coordination	26 (T1)
36	Body's Control Mechanism - II	Immune system and defense mechanisms	26 (T1)
37		Humoral and cell-mediated immune responses, Blood typing and AIDS	26 (T1) & Class notes
38-39	Sex and reproduction	Chromosomal determination of sex, male and female foetal development, hormonal control of fertility, fertilization, pregnancy and contraception	27(T1)

**Self study** : Ecology – Ecosystem organization and energy flow:  
Chapter 15.1 to 15.3 (T1)

**Evaluation scheme:**

EC No.	Evaluation component	Duration	Weight age, % (Marks)	Date and time	Remarks*
1.	Test – 1	50 min	20% (60)		OB
2.	Test – 2	50 min	20% (60)		OB
3.	Surprise tutorial tests	Diverse	20% (60)		CB
4.	Comprehensive examination	3 Hrs	40% (120)	01/05	CB

\* OB: Open book, CB: Closed book

**Chamber consultation hour:** Will be announced by the section instructor.

**Notices:** All notices regarding this course will be displayed on the notice board of biological sciences group, located on the 1<sup>st</sup> floor of A-Block.

**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, attendance in classes, and the section instructor's assessment of the student.

**Make-up policy:** As per Clause 4.07 of BITS academic regulations booklet.

Instructor-in-charge  
BIO F111