FirstSemester 2017-18

Course Handout (Part II)

Date: 04-Aug-2017

In addition to part-I (General Handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

Course No : BIO F111
Course Title : GENERAL BIOLOGY
LPU : 3 0 3
Instructor-in-Charge :Dr. Manoj Kannan (manojkannan@pilani.bits-pilani.ac.in)
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1. Course Description:

Living systems and their properties; biochemistry and cell biology; primary biochemical/metabolic pathways; introductory genetics; biotechnology and its applications; basic human physiological processes. These topics will be taught using an integrated approach – by interlacing concepts at the cellular level with those that happen at the organ system level.

2. Scope and Objectives:

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 core biological principles and wide-ranging applications of biology in industry, medicine and human health.

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:

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.

Raven, P.H., *et. al.*Biology (9th ed.). Singapore: McGraw-Hill Publishing Company Ltd., 2012.

Starr, Cecie. Biology: Concepts and Applications (6th ed.). India: Thomson Brooks/Cole, 2007.

5. Lecture Plan:

Lec. No.	Learning Objectives	Topics to be covered	TB Chap. No.	Learning Outcomes
1-2 (2)	Getting introduced to biology and its scope	Biology and scientific method; characteristics of life; diversity of life and classification of living forms; two major types of cells	1,4	• Develop the right motivations to learn the subject

Lec. No.	Learning Objectives	Topics to be covered	TB Chap. No.	Learning Outcomes
3-4 (2)	Organic chemistry of living things	Introduction to the macromolecules of cell	3	• Differentiate between the types of organic molecules that cells are made of • Associate organelles (in different types of cells) with their cellular functions
5-7 (3)	Components of the cell and its internal workings	Introducing microscopy; nucleus and ribosomes; endomembrane system; energy converters; cytoskeleton; ATP and cellular work; membrane function	4,5	
8-9 (2)	Processes involved in photosynthesis	Basics of photosynthesis; light reactions; Calvin cycle	7	• Trace the steps of how food is manufactured by plants, consumed by heterotrophs and is ultimately used to give energy to cells • Contrast the various ways by which cells harness energy from food, under varying conditions
10-12 (3)	Unifying concepts of animal structure and function	Introducing human physiology; the structural organization of animals – tissues, organs and organ systems; exchanges with the external environment (drawing examples from digestive system and excretory system)	13,14	
13-14 (2)	How cells acquire energy	Energy flow and chemical cycling; cellular respiration - three stages of generating ATPs; process of fermentation	6	
15-17 (3)	Mechanisms and processes involved in cellular reproduction	The cell cycle and mitosis; meiosis and the origins of genetic variation; consequences of improper cell division (cancer and chromosomal disorders)	8	• Differentiate between mitosis and meiosis, in terms of mechanisms, chromosomal numbers and contexts of use • Ability to solve simple problems of predicting outcomes of crosses • Develop an appreciation of how genes work and give rise to characteristics in an individual
18-21 (4)	Patterns of inheritance: Mendelian genetics and beyond	Mendel's experimentation and laws; solving problems in Mendelian inheritance; family pedigrees; human disorders; variations on Mendel's laws	9	
22-25 (4)	Structure and function of DNA, and viruses	DNA structure and replication; the genetic code; transcription; eukaryotic RNA processing; translation; mutations; viruses	10	
26-27 (3)	Genetic regulation and the process of cloning	How and why genes are regulated; cloning plants and animals; the genetic basis of cancer	11	• Understand how the cell controls genes and how this knowledge can be applied in biotechnology • Learning how knowledge of biology is applied in society
28-31 (3)	Principles of DNA manipulation and applications of DNA technology	Introducing recombinant DNA technology and techniques for DNA manipulation; DNA fingerprinting; genomics and proteomics	12	
32-34 (3)	Nervous, sensory and motor systems	Neurons and nerve impulses; central and peripheral nervous systems; senses; nervous system disorders	19	• Associate the constituent components with organ systems in the body, and ascribe functions to each of them • Identify how each of these body systems contribute to homeostasis
35-36 (2)	The body's defenses (Immune system)	Non-specific defenses; specific defenses (adaptive immune system); immune disorders	16	
37 (1)	Hormonal control in humans	General principles of hormone action and specific examples of glands and hormones	17	
38-40 (3)	Concepts of human reproduction and development	Human sexuality spectrum; human male and female reproductive systems, gametogenesis; hormonal control of female reproduction; human development	18	• Develop a scientific awareness about reproductive heath and reproductive behaviours

41 (1)	Conclusion of the course	Summarizing and integrating overall principles of biological systems	-	-

6. Self-study Topic:

Principles and functions of human circulatory and respiratory systems (Chapter 15)

7. Evaluation Scheme:

Evaluation Component	Duration	Marks	Date and Time	Remarks
Course Quiz-1	40-50 min.	25	To be announced	Closed-book type
Mid-semester Test	90 min.	45	13/10 4:00 - 5:30 PM	Closed-book type
Course Quiz-2	40-50 min.	25	To be announced	Closed-book type
Assignments/ Homework	-	16	-	To be periodically handed out in classes
Class participation	-	9	Regularly assessed	To be held in tutorial classes
Comprehensive Examination	3 hrs.	80	12/12 AN	Open-book type; may include a closed-book section

8. Academic Conduct Policy:

It is expected that all students follow the highest standard of academic practice when participating in any evaluation component. Having a zero–tolerance for academic dishonesty, any case of misconduct, however minor, will be dealt with appropriately. The case may be reported for action to the Examination Committee, if necessary.

9. Grading Policy:

Award of grades would be guided by the histogram of marks and course average. If a student is absent in any one of components (listed in the Evaluation Scheme above) entirely, his/her performance in the course may be reported as 'NC' (Not Cleared). The same procedure will be followed for mid-semester and final grading. For a student on the borderline of two grades, the decision on the award of grade will be taken based on progressive improvement he/she has shown throughout the semester, overall course attendance and the tutorial instructor's recommendation (regarding student's promptness in turning in assignments and involvement shown in the class).

10. 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 or absence from classes due to official purposes) there exists a provision to apply for make-up. Prior permission must be taken from the Instructor-in-Charge whenever possible, before applying; otherwise, he must be informed at the earliest after missing the component. The decision to grant make-up or not is taken by the Instructor-in-Charge (in consultation with the other instructors) and shall be final.

11. Chamber Consultation:

For any assistance in the course and clarifications, students can meet the instructors who will make themselves available at least one hour per week (chamber consultation hour). The lecture and tutorial instructors will announce their availability for consultation during the first class meeting.

12. Course Announcements and Notices:

All announcements regarding the course will be made in the lecture classes. Certain others information (e.g. seating arrangement and venue for exams) will be also be made available on the course webpage on Nalanda (http://nalanda.bits-pilani.ac.in).

Instructor-in-Charge
BIO F111