header.wmf

**Birla Institute of Technology and Science, Pilani** Hyderabad Campus

**Second SEMESTER 2021-2022**

**Course Handout (Part II)**

Date: 07.05.2022

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 No.:** BIO F111

**Course Title:** General Biology

**Instructor-in-Charge:** RUCHI JAIN DEY

**Instructors: Lecture-** Prof. Naga Mohan K & Dr. Ruchi Jain Dey

**Tutorial-** Prof. Naga Mohan K, Prof. Kumar Pranav Narayan, Prof. Debashree B, Dr. Shuvadeep Maity

**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 studyis 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, 14thEdition

(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, 6thEdition, Thomson Learning.

**Suggested Reading**

**: S1:** Campbell, N.A., Reece J.B., Biology, 7thEdition, Pearson Education Inc, 2009. **S2:** Campbell, N.A.,*et. al.*Essential Biology with Physiology, 2ndEdition,Pearson Education Inc, 2009.

**Course Plan:**

|  |  |  |  |
| --- | --- | --- | --- |
| ***Lecture Number*** | ***Learning objectives*** | ***Topics to be covered*** | ***Chapter in text book*** |
| 1 | Introduction | Introduction to biology and its importance to daily life | **1.4** |
| **2** | Chemistry of life: Molecules of life | Organic chemistry, carbohydrates | **3** |
| **3** | Lipids and proteins |
| **4** | 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, 7** |
| **11** | Electron Transport System, ATP calculation |
| **12** | Fermentation Protein and fat metabolism |
| **13** | Photosynthesis |
| **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, stem cells, biotechnology & Ethics |
| **22** | Cell division | 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 | **25** |
| **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** | Endocrine system, sensory input (taste, smell, vision, hearing & touch) |
| **38** | Output coordination (muscle contraction), immune system and defense mechanisms |
| **39** | Acquired and cell-mediated immune responses, blood typing and AIDS |
| **40** | Sex and reproduction | Chromosomal determination of sex, male and female fetal development | **27** |
| 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 Midsem and Comprehensive exams etc.

**Evaluation Scheme:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Evaluation component*** | ***Duration*** | ***% (Marks)*** | ***Date and time*** | ***Nature of the component*** |
| **Mid Semester Examination** | 90 min | 30 (60) | 01/07/22, 3:30-5pm | Closed Book (30%) |
| **Surprise quizzes** **(Best 3/4)** | 30 min | 30 (60) | Surprise quizzes will be conducted during lecture hour or tutorial hour. | Closed Book (30%) |
| **Comprehensive examination** | 3 Hrs | 40 (80) | 13/08/2022  AN | Open Book (20%) + Closed Book (20%) |
| **Total Open Book = 20%; Total Marks = 200M** | | | | |

**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 caseswill 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 ofabsence. 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 which are part of regular evaluations 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 studentsthroughout the semester and no type of academic dishonesty is acceptable.

**Ruchi Jain Dey**

Email: [ruchij80@hyderabad.bits-pilani.ac.in](mailto:ruchij80@hyderabad.bits-pilani.ac.in)

Office: A115A, Dept. of Biological Sciences,

**Instructor In-charge**

**BIO F111**