



FIRST SEMESTER 2020-2021

Course Handout Part - II

17-08-2020

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: Dr. Trinath Jamma

Instructors: **Lecture-**Shuvadeep Maity & Kirtimaan Sayl

Tutorial- 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.

Text book (11th edition) and reference book are available for purchase from online vendors

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 | Proteins and nucleic acids | |
| 4 | Molecules of life | | |
| 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 | |

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| 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 | |

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|----|--|--|--------------------------------|
| 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 |
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| 31 | | Hardy-Weinberg equilibrium and its applications | & 13.9 |
| 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 | | Endocrine system | |
| 38 | | 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.

Lecture Hours: Tuesday, Thursday, Saturday (2nd hour); **Tutorial Hour** (Thursday 6th hour)

Evaluation Scheme:

| <i>Evaluation component</i> | <i>Duration</i> | <i>% (Marks)</i> | <i>Date and time</i> | <i>Nature of the Component</i> |
|--|------------------------|-------------------------|---|---------------------------------------|
| Test 1 | 30 min | 15% (30M) | September 10 – September 20 (during scheduled class Hour) | OB |
| Test 2 | 30 min | 15% (30M) | October 9- October 20(during scheduled class hour) | OB |
| Test 3 | 30 min | 15% (30M) | November 10- November 20 during scheduled class hour) | OB |
| Quiz X3 (all are considered for evaluation) | 30 min each | 10+10+10%(60M) | Will be announced | OB |
| Comprehensive examination | 120min | 25% (50M) | Will be announced | OB |

*Test/ Quiz will be conducted during Lecture/tutorial hours.

Chamber Consultation Hour: To be announced by the respective lecture/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.

TRINATH JAMMA
Instructor In-charge
BIO F111 GENERAL BIOLOGY