

BIOLOGY FOR ENGINEERS (BIO1051 - 3 credits; 36 Hours)

SYLLABUS

Course Outcomes:

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CO1: The basic elements and their bonding ability, macromolecules and their structures and their role and general law of thermodynamics in biological systems.

CO2: Mendel's rules for inheritance, chromosomal theory of inheritance, relationship of Mendelian inheritance to meiosis and pedigree analysis of genetic disorder diseases.

CO3: DNA as hereditary material, its replication, protein synthesis and their variation in Central Dogma for eukaryotes, prokaryotes & Viruses

CO4: Evolution as a tool for improvising existing life forms and few examples of evolutionary modifications. CO5: Few case studies which gives insight in to overall picture of life from micro-level to macro-level and few applications in Biotechnology.

Building blocks of life: Elements of life and their bonding ability, importance of carbon, elemental replacement, different types of bonds and interactions in biological systems, water and phospholipids as well as their importance in the survival of life, Macromolecules such as carbohydrates and proteins, their structures, enzymes, effect of pH and Bioenergetics. (7 Hours) - **UNIT 1**

Flow of information in living systems: Mendelian model and its testing, Location of factors and its mode of inheritance, Morgan concept on location of factors, pedigree analysis. (7 Hours)- **UNIT 2**

Information storage and maintenance in living systems: Discovery of DNA, Griffiths transformation experiment, Chargaff's rule, Meselson and Stahl experiment, Kornberg experiment, structure of DNA, DNA copying mechanism and its proof reading as well as editing, RNA synthesis and processing, Protein synthesis and Genetic code. (8 Hours) - **UNIT 3**

Organization and Evolution of living systems: Biological hierarchies, modularity and incremental change, how living systems improves by itself through evolution, Darwin's model, Concepts of evolution, Evolution of hemoglobin (6 Hours) - **UNIT 4**

Case studies: Mechanism of viral replications, Lac operon as an example of biological control system, Concepts of cloning, Recombinant DNA technology, vaccination and ascent of sap. (6 Hours)- **UNIT 5**

Bioinspiration: Few examples of bioinspiration models used in engineering (2 Hours)

References

Sadava DE, Hillis DM, Heller HC and Hacker SD, 2107. Life the science of biology, 11th edition, Macmillan Learning, USA ISBN-10: 1-319-01016-4.

Urry LA, Cain ML, Wasserman SA, Minorsky PV and Reece JB, 2017. Campbell biology, 11th edition, Pearson ISBN-10: 0134093410

Johnson AT, 2010. Biology for Engineers, CRC Press Inc., USA, ISBN 9781420077636