

DISCIPLINE SPECIFIC CORE COURSES

BZO: C401: CELL BIOLOGY

(Credits: Theory-4, Practicals-2)

SEMESTER –IV

Lectures: 60

Unit 1

Overview of Cells and Plasma Membrane

Prokaryotic and Eukaryotic cells, Virus, Viroids, Mycoplasma, Prions,

Unit 2

Plasma Membrane

Various models of plasma membrane structures, Transport across membranes: active and passive transport, facilitated transport; Cell-cell junctions, structures and functions: Tight junctions, adherens junctions, gap junctions

Unit 3

Endomembrane system

Structure and Functions: Endoplasmic Reticulum, Signal hypothesis, Vesicular transport from ER to Golgi apparatus; Protein sorting and transport from Golgi apparatus; Golgi apparatus, Vesicular transport: Coated Vesicles; Lysosomes; Peroxisomes.

Unit 4

Mitochondria and Nucleus

Structure, Endo-symbiotic hypothesis; Respiratory chain, Chemiosmotic hypothesis and ATP Synthase., Structure of Nucleus: Nuclear envelope, Nuclear pore complex, Chromatin: euchromatin, heterochromatin and packaging, nucleosome, nucleolus

Unit 5

Cytoskeleton and Cell Division

Structure and Functions: Microtubules, Microfilaments and Intermediate filaments. Mitosis, Meiosis, Cell cycle and its regulation

SUGGESTED READINGS

1. Karp, G. (2010). *Cell and Molecular Biology: Concepts and Experiments*. VI Edition. John Wiley and Sons. Inc.
 2. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). *Cell and Molecular Biology*. VIII Edition. Lippincott Williams and Wilkins, Philadelphia.
 3. Cooper, G.M. and Hausman, R.E. (2009). *The Cell: A Molecular Approach*. V Edition. ASM Press and Sunderland, Washington, D.C.; Sinauer Associates, MA.
 4. Becker, W.M., Klein smith, L.J., Hardin. J. and Bertoni, G. P. (2009). *The World of the Cell*. VII Edition. Pearson Benjamin Cummings Publishing, San Francisco.
 5. Bruce Albert, Bray Dennis, Lewis Julian, Raff Martin, Roberts Keith and Watson James (2008). *Molecular Biology of the Cell*, V Edition, Garland publishing Inc., New York and London.
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SKILL ENHANCEMENT COURSE
BZO: S402 ANIMAL BIOTECHNOLOGY
(Credits: Theory-4)

SEMESTER –IV

Lectures: 60

Unit 1

Introduction

Definition, History of biotechnology, Types of biotechnology, Concept and scope of biotechnology

Unit 2

Basic Tools for Gene Manipulation

Cloning vectors: Plasmids, Cosmids, Phasmids, Lambda Bacteriophage, M13, BAC, YAC, MAC and Expression vectors (characteristics). Restriction enzymes: DNA modifying enzymes. Basic concept of Recombinant DNA Technology (RDT)

Unit 3

Molecular Tools and Techniques

Southern, Northern and Western blotting, DNA sequencing: Sanger method, Next generation sequencing (Illumina), Polymerase Chain Reaction, DNA Finger Printing

Unit 4

Genetically Modified Organisms

Production of cloned and transgenic animals: Nuclear Transplantation, Retroviral Method, DNA microinjection; Applications of transgenic animals: Production of pharmaceuticals, production of donor organs

Unit 5

Applications of Genetic Engineering

Molecular diagnosis of genetic diseases (Cystic fibrosis, Sickle cell anemia), Recombinant DNA in medicines: Recombinant insulin and human growth hormone, Gene therapy

SUGGESTED READINGS

1. Brown, T.A. (1998). *Molecular Biology Labfax II: Gene Cloning and DNA Analysis*. II Edition, Academic Press, California, USA.
 2. Glick, B.R. and Pasternak, J.J. (2009). *Molecular Biotechnology - Principles and Applications of Recombinant DNA*. IV Edition, ASM press, Washington, USA.
 3. Griffiths, A.J.F., J.H. Miller, Suzuki, D.T., Lewontin, R.C. and Gelbart, W.M. (2009). *An Introduction to Genetic Analysis*. IX Edition. Freeman and Co., N. Y., USA.
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Lab Course: BZO: P451

A. CELL BIOLOGY

1. Principle of Light microscope, Phase contrast microscope and Electron microscope and principle of cell fixation, staining and fractionation.
2. Gram's staining technique for visualization of prokaryotic cells
3. Study various stages of mitosis from permanent slides
4. Study various stages of meiosis from permanent slides.
5. Study the presence of Barr body in human female blood cells/cheek cells. (Preparation of permanent slides)