SEMESTER 2nd

MINOR COURSE

BCH222N: BIOCHEMISTRY (CELL BIOLOGY AND MICROBIOLOGY)

CREDITS: THEORY - 04; PRACTICALS - 02

Course Objective:

The course aims to offer insights into the basic structure of eukaryotic and prokaryotic cells including cellular organelles and their function. The laboratory course is aiming to train the students regarding the techniques involved in cell culture, study of cell structure and blood group typing.

Course outcome:

After successful completion of the course our students will be:

- *Able to differentiate various cell types including prokaryotic and eukaryotic cells.*
- *Proficient in differentiating animal vs plant cells*
- *Well versed about the various cellular organelles and their function.*
- *Able to comprehend about cell to cell communication.*
- *Able to comprehend the drug sensitivity of gram positive vs gram negative bacteria.*

THEORY (4 CREDITS)

Unit I: Cell wall and membranes (15 HOURS)

Structure of eukaryotic cells- Overview of plant and animal cells, Composition, structure and functions of cell wall and cell membranes. Membrane transport (Active and passive), Membrane channels, carriers, and transporters.

Unit II: Cell organelles (15 HOURS)

Structure and functions of Nucleus- nuclear envelope, nuclear pore complex, nucleolus, Concept of chromatin and chromosome. Endoplasmic Reticulum- RER - Brief overview of co-translational and posttranslational transport of proteins; SER - Lipid synthesis, brief overview of export of proteins from ER to Golgi, Mitochondria, Golgi apparatus- organization, brief overview of glycosylation of proteins within Golgi. Ribosomes, structure and functions of lysosomes, peroxisomes, cytoskeleton (microtubules- Structure, assembly and function of Microtubules: Axonemal and cytoplasmic microtubules, cilia, flagella, centrioles, basal bodies)

Unit III: Cell communication (15 HOURS)

Cell communication- basic concept of anchoring junctions, tight junctions and communication junctions (gap junctions and plasmodesmata); ECM components - proteins, polysaccharides and adhesion proteins Cell signaling- Types, signal molecules, signal amplification, receptor types and sensing.

Unit IV: Microbiology (15 HOURS)

General organization of bacterial cell, Cell wall structure of gram (+ve) and gram (-ve) bacteria. Bacterial growth, culture of bacteria and types of culture media. Sterilization and disinfection. Introduction to viruses- HBV, HIV, SARS-2,

PRACTICAL (2 CREDITS: 60 HOURS)

1) Sterilization techniques
2) Preparation of bacterial culture media
3) Bacterial Staining
5) Observation of cellular Morphology-Eukaryotic and Prokaryotic.
6) Blood group typing

BOOKS RECOMMENDED:

1. The Cell: A Molecular Approach (2013) 6th ed., Cooper, G.M. and Hausman, R.E., ASM Press & Sunderland (Washington DC), Sinauer Associates, MA, ISBN: 978-0- 87893-300-6.
2. Molecular Biology of the Cell (2008) 5th ed., Alberts, B., Johnson, A., Lewis, J., and Enlarge, M., Garland Science (Princeton), ISBN: 0-8153- 1619-4 / ISBN: 0-8153-1620- 8.
3. Cell and Molecular Biology: Concepts and Experiments. (2010). Karp, G., 6th ed. John Wiley and Sons. Inc. ISBN: 978-1-118-65322-7
4. Essential Cell Biology (4th Edition) by Alberts et al.
5. The Cell A Molecular Approach by Couper and Housman
6. Fundamentals of Cell Biology by S K Singh
7. Online source- https://nptel.ac.in/.