

SYLLABUS

OBJECTIVES: To enable the students to

1. Comprehend the historical perspective of microbiology, techniques of studying and culturing of microorganisms.
2. Get knowledge on classification of microbes and their industrial applications.
3. Learn about cell structure and function.
4. Understand the cell signaling and control mechanisms.
5. Get an insight of genome organization of prokaryotic and eukaryotic organisms.

COURSE OUTCOMES: Students will

- **CO1:** Be consciousness in microbial world & expertise in Ultra structure and physiology.
- **CO2:** Be approved in characterization of microbial forms with the available methods. Also bolster about viruses and bacteriophages
- **CO3:** Acquainted with the ultra structure of nucleus and its organization
- **CO4:** Be proficient in cell cycle and cell division.
- **CO5:** Be expertise in DNA replication & repair, transcription, translation

Unit-I- Scope and Techniques of Microbiology

1. History and contribution of Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister and Alexander Fleming.
2. Ultra structure of bacteria and growth curve. Pure culture techniques.
3. Sterilization techniques, principles and application of physical methods (autoclave, hot air oven, incineration), chemical methods and radiation methods. Simple, gram, acid-fast staining.

Unit-II-Microbial Taxonomy and Metabolism

1. Concepts of microbial species and strains. Classification of bacteria based on morphology, nutrition and environment. General characteristics, transmission and cultivation of viruses.
2. Structure and properties of plant (tobacco mosaic virus, TMV), animal (Newcastle disease virus, NDV), human (Human immunodeficiency virus, HIV) and bacterial viruses (T4 phage). Emerging and reemerging viruses (dengue virus), zoonotic viruses (rabies, SARS-CoV-2).
3. Microbial production of penicillin. Bacterial toxins, tuberculosis, typhoid. Introduction to fungi, algae and mycoplasma.

UNIT III: Cell Structure and Functions

1. Structure, properties and functions of cellular organelles (E.R, Golgi bodies, Mitochondria, Ribosomes and Vacuoles) of eukaryotic cells.
2. Cell cycle and its regulation.
3. Cell division (mitosis and meiosis).

Unit-IV- Cell Signaling

1. Chemical composition and dynamic nature of the membrane.
2. Cell surface receptors
3. Cell signaling and communication (GPCR – cAMP, cGMP, IP3-DAG).

Unit – V - Central Dogma of Molecular Biology

1. Genome organization of prokaryotic and eukaryotic organisms.
2. Enzymes involved in replication, transcription and translation.
3. DNA repair mechanism.

REFERENCES

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3. Textbook of Microbiology, Anantnarayan and Paniker (2017)
4. Cell and Molecular Biology: Concepts and Experiments, 6th Edition, Karp, G. 2010.; John Wiley & Sons. Inc.
5. David A. Thompson. 2011. Cell and Molecular Biology Lab. Manual.
6. Cell Biology & Genetics by Varma & Agarwal (2008-2009) S.Chand Publications.

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