

SEMESTER II BIOTECHNOLOGY SYLLABUS

Course Code	Microbiology, Cell and Molecular Biology				
Teaching	Hours Allocated: 60 (Theory)	L	T	P	C
Pre-requisites:		3	1	-	4

Course Objectives:

To acquaint students with concepts of microbiology, cell and molecular biology. This course is aimed to give an understanding of the basics of microbiology, dealing types of microbes, classification and their characterization, structure and function of prokaryotic and eukaryotic cell organelles, cell division and basics of molecular biology including DNA replication, transcription, translation and regulation of gene expression.

Outcomes:

On Completion of the course, the students will be able to-

CO1	Explain relationship and apply appropriate terminology relating to the structure, Genetics, metabolism and ecology of prokaryotic microorganisms, Algae, viruses and Fungi.
CO2	Demonstrate appropriate laboratory skill and techniques related to isolation, staining, identification and control of microorganisms.
CO3	Course will impart knowledge on role of cell organelles, cell division and its regulation.
CO4	Imparts knowledge on mechanism of replication, transcription and translation.

Skill Development		Employability		Entrepreneurship	
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Syllabus:

UNIT-I:

Scope and Techniques of Microbiology:

- 1.1 History and contribution of Leeuwenhoek, Louis Pasteur and Robert Koch.
- 1.2 Bacteria, Ultra structure of a bacterial cell and growth curve.
- 1.3 Sterilization techniques, principles and application of physical methods (autoclave, hot air oven, incineration),
- 1.4 Chemical methods of sterilization and radiation methods.
- 1.5 Staining- Simple, gram and acid-fast staining.

UNIT-II:

Microbial Taxonomy and Metabolism:

- 1.1 Concepts of microbial species and strains. Classification of bacteria based on morphology, nutrition and environment.
- 1.2 General characteristics of viruses.
- 1.3 Structure of TMV and HIV.
- 1.4 Structure, infection, diagnosis and treatment of and SARS- CoV
- 1.5 Introduction to fungi, algae and Mycoplasma

UNIT-III:

Cell Biology:

- 3.1 Differentiation between plant and animal cell.
- 3.2 Chemical composition and dynamic nature of the membrane.
- 3.3 Structure, properties and functions of cellular organelles (E.R, Golgibodies, Mitochondria, Ribosomes and Vacuoles) of eukaryotic cells.
- 3.4 Cell cycle and cell division (mitosis and meiosis).
- 3.5 Cell signaling via G- protein coupled receptors.

UNIT-IV:

DNA Replication, Damage and Repair:

- 4.1 Genome organization of prokaryotic organisms.
- 4.2 DNA replication in prokaryotes (semiconservative, dispersive, conservative, uni and bi-direction, rolling circle).
- 4.3 Enzymes and Proteins involved in DNA replication.
- 4.4 Mechanism of DNA replication,
- 4.5 DNA damage and repair.

UNIT – V

Transcription and Translation in prokaryotes:

- 5.1 Promoters and structure of RNA Polymerase.
- 5.2 Mechanism of Transcription in prokaryotes.
- 5.3 Genetic code, Activation of tRNA.
- 5.4 Mechanism of translation in prokaryotes.
- 5.5 Regulation of gene expression with reference to Lac operon.

Textbooks

1. Textbook of Microbiology, Anantnarayan and Paniker (2017)
2. Molecular Biology, 5th Edition, (2011), Weaver R.; McGraw Hill Science. USA.
3. George M. Malacinski. 2013. Freifeder's Essentials of Molecular Biology. Narosa Publishing House.

Referencebooks:


1. Genes XI, 11th edition, (2012), Benjamin Lewin; Publisher - Jones and Barlett Inc.USA
2. Molecular Biology of the Gene, 6th Edition, (2008), James D. Watson, J. D., Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R.; Cold Spring Harbour Lab. Press, Pearson Pub.
3. The Cell: A Molecular Approach. 5th edition. Cooper, G.M. and Hausman, R.E. 2009. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.

Weblinks

CO-PO Mapping:

(1:Slight[Low]; 2:Moderate[Medium]; 3:Substantial[High] :No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	2	3	3	3	3	2	2	2
CO2	3	2	3	2	3	1	3	3	3	2	2	2
CO3	1	2	3	2	3	2	3	3	3	1	2	1
CO4	2	3	3	2	2	2	3	2	2	2	2	1

	Pithapur Rajah's Government College (Autonomous) Kakinada	Program &Semester I B.Sc Semester -II			
Course Code	Microbiology, Cell and Molecular Biology				
Teaching	Hours Allocated: 60 (Lab)	L	T	P	C
Pre-requisites:		-	-	3	1

Course 2: Microbiology, Cell and Molecular Biology Lab

Total Hours: 30

Credits: 1

List of Practical:

1. Demonstration, use and care of microbial equipment
2. Cleaning and preparation of glassware
3. Preparation of nutrient agar medium for bacteria
4. Preparation of PDA medium for fungi
5. Sterilization techniques (autoclave, hot air oven, filter)
6. Isolation of bacteria from soil
7. Simple staining technique
8. Differential staining technique
9. Microbial counting by Haemocytometer
10. Identification of different bacteria
11. Motility test by hanging drop
12. Biochemical identification of bacteria
13. Preparation of pure culture by slab, slant, streak culture
14. Study of stages of mitotic cell division
15. Study of stages of meiotic cell division
16. Isolation of chloroplast
17. Extraction and isolation of DNA from Bacteria