

INSTITUTE	FACULTY OF SCIENCE
PROGRAM	BACHELOR OF SCIENCE (MICROBIOLOGY)
SEMESTER	3
COURSE TITLE	MICROBIAL BIOCHEMISTRY
COURSE CODE	02MB0204
COURSE CREDITS	4

Objective:

- 1 To provide comprehensive information about enzymology, cellular transport, carbon utilization and amino acid metabolism in microorganisms

Course Outcomes: After completion of this course, student will be able to:

- 1 Understand Enzymes along with its structure, function, mechanism, kinetics and regulation
- 2 Comprehend the mechanism of transport of ions and small molecules across cell membranes
- 3 Understand the complete oxidation from Glucose along with other associated pathways and regulation
- 4 Understand amino acid metabolism and its regulation

Pre-requisite of course: Biomolecules, Cell Biology

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	0	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	Enzymology Introduction; Classification of Enzymes; Mechanism of Enzyme Action; Factors affecting Enzyme activity; Enzyme Kinetics; Enzyme Regulation: Activation, Induction & Inhibition	15
2	Membrane Structure & Components Membrane transport of small molecules; Specific Transport Systems; Mechanosensitive channels, ATP-binding Cassette Transport family, Chemo-isosmotic-driven transport, Establishing Ion Gradients, Iron transport. The phosphotransferase system, Quorum sensing, Signal Transduction	10

Contents : Unit	Topics	Contact Hours
3	Carbohydrate Metabolism Glycolysis: ED pathway, EMP pathway, PPP Pathway, Gluconeogenesis; Citric acid cycle: Glyoxylate cycle; Electron Transport Chain; Utilization of sugars other than glucose and complex polysaccharides; Regulation of Glycolysis & TCA, Phosphotransferase system.	20
4	Protein & Amino Acid Metabolism, Lipid and Fatty acid metabolism Protein breakdown; Amino acid breakdown and biosynthesis; Amino acid oxidation & deamination, Lipid and Fatty Acid Metabolism: Lipase activity, Beta oxidation of Fatty acids (Saturated and Unsaturated).	15
Total Hours		60

Textbook :

- 1 The Physiology and Biochemistry of Prokaryotes, 4th Edition , David White, James Drummond & Clay Fuqua, Oxford University Press, 2012
- 2 Lehninger's Principles of Biochemistry, 6th edition, David L. Nelson and Michael M. Cox; W. H. Freeman, New York : Worth Publishers, 2013
- 3 Fundamental of Biochemistry, 5th edition, Donald Voet, Judith G. Voet, W. Pratt, Wiley, 2016

References:

- 1 Biochemistry, 4th edition, Biochemistry, 4th edition, Satyanarayana U, Books and Allied Press Limited, 2013
- 2 Microbial Physiology, 3rd edition, Microbial Physiology, 3rd edition, Albert G. Moat and John W. Foster, John Wiley and Sons, 2002
- 3 Physical biochemistry: Principles and applications , Physical biochemistry: Principles and applications , David Sheeham, John Wiley and Sons, 2009
- 4 Physical biochemistry: Applications to Biochemistry & Molecular Biology, Physical biochemistry: Applications to Biochemistry & Molecular Biology, David Freifelder, W. H. Freeman, 1982

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
20.00	30.00	25.00	15.00	10.00	0.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the class-room in the form of attendance, assignments, verbal interactions etc
- 3 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

- 1 <https://youtu.be/qgVFkRn8f10>
- 2 <https://youtu.be/Ptmlvtei8hw>
- 3 <https://youtu.be/eJ9Zjc-jdys>
- 4 <https://youtu.be/8qij1m7XUhk>
- 5 <https://youtu.be/0M-B2dOfcUo>