COURSE TITLE	**MICROBIAL METABOLISM**
COURSE CODE	**02MB0458**
COURSE CREDITS	**4**

Objective:

1 To offer extensive information about central & peripheral metabolic pathways and developing the perception about bioenergetics and metabolic engineering.

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

1 Establishinsight on biosynthesis &breakdown pathways of Biomolecules.

2 Relate the concept of regulation and overproduction in metabolism.

3 Improveperceptions aboutmetabolic reactions and bioenergetics.

Pre-requisite of course:NA

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	**Carbohydrate Metabolism:** Carbohydrate uptake; Phosphotransferase system, Glycolysis: ED pathway, EMP pathway, PPP Pathway; Gluconeogenesis; Fates of Pyruvate; Citric acid cycle: Branched TCA, Glyoxylate cycle; ETC & its components; Utilization of sugars other than glucose and complex polysaccharides; Regulation of Glycolysis & TCA, Bioenergetics of Carbohydrate metabolism. Comparison of Carbohydrate metabolism in different organisms.	15
2	**Amino acid & Protein Metabolism:** Proteases, Breakdown of proteins, peptides & Amino Acids; Nitrogen fixation, Ammonia & Sulphur assimilation, GS-GOGAT reaction; Amino acid reactions: Oxidation, Transamination, Deamination, Decarboxylation; Amino acid biosynthesis; Stickland reaction; The Urea Cycle.	15
3	**Fatty Acid & Lipid Metabolism:** Classification & Applications of Lipases, Breakdown of Fatty acid by ß-oxidation (Saturated & Unsaturated); Biosynthesis of Fatty Acids, Phospholipids & Isoprenoids; Regulation of Fatty Acid Metabolism.	15

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Contents : Unit	Topics	Contact Hours
4	**Metabolic Regulation:** Overview of cellular Bioenergetics; Regulation of metabolism: Regulation of protein synthesis; Regulation of enzyme activity; Metabolite Over Production & Metabolic engineering.	15
Total Hours		**60**

Textbook :

1 Fundamentals of Biochemistry, Donald Voet, Judith G. Voet, W. Pratt, Wiley publishers., 2016

2 Physical biochemistry: Principles and applications, David Sheeham, John Wiley and Sons., 2009

References:

1 The Physiology and Biochemistry of Prokaryotes , The Physiology and Biochemistry of Prokaryotes , David White, James Drummond & Clay Fuqua, Oxford University Press., 2012

2 Lehninger's Principles of Biochemistry, 6th edition,, Lehninger's Principles of Biochemistry, 6th edition,, David L. Nelson and Michael M. Cox, 7.W. H. Freeman., 2013

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**
10.00	20.00	25.00	25.00	10.00	10.00

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://archive.nptel.ac.in/courses/102/103/102103015/

2 https://onlinecourses.nptel.ac.in/noc24_bt12/preview

3 https://onlinecourses.swayam2.ac.in/cec21_bt17/preview

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