1. Gain a comprehensive understanding of the fundamental principles of metabolic pathways and their regulation in various organisms.
2. Develop the ability to analyze and map metabolic pathways, including the identification of key enzymes and metabolites.
3. Learn techniques for genetic manipulation and enzyme engineering to alter metabolic pathways for desired outcomes.
4. Acquire proficiency in using computational tools and models to simulate and optimize metabolic networks for biotechnological applications.
5. Gain hands-on experience in laboratory techniques used in metabolic engineering, including cloning, gene editing, and metabolic flux analysis.

S. No.	Content	Contact Hours
1.	**Basic concepts of metabolic engineering:** Overview of cellular metabolism	8
2.	**Synthesis of primary and secondary metabolites**	8
3.	**Bioconversions:** Factors affecting bioconversions and Application	8
4.	**Metabolic Flux:** Integration of anabolism and catabolism, Regulation of Enzyme production	9
5.	**Metabolic engineering and Bioinformatics**	9
	TOTAL	42

Books: -

S.No.	Name of Books/ Author/Publisher
1	Wang.D.I.C Cooney C.L., Demain A.L., Dunnil.P. Humphrey A.E. Lilly M.D., Fermentation and Enzyme Technology, John Wiley and sons
2	Stanbury P.F., and Whitaker A., Principles of Fermentation Technology,Pergamon Press
3	Metabolic Engineering: Principles and Methodologies Gregory N. Stephanopoulos, Aristos A. Aristidou , Jens C. O. Nielsen
4	Metabolic Engineering Sang Yup Lee, E. Terry Papoutsakis

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