

Detailed Class Schedule: Metabolic Systems Biology for Biofuels

Contents	Lectures
1. Introduction to systems biology and bioenergy: cell metabolism: glycolysis PP and others pathways, biochemical reactions, integration of components & cell systems	4
2. Biochemical Networks for bioenergy: Metabolic networks, regulatory networks, signaling networks, probabilistic regulation of metabolism, understanding metabolic systems biology	6
3. Mathematical representation and simulation of biochemical Networks: Stoichiometric Matrix, Finding Functional States of Networks, Fundamental Subspaces, Properties of solution spaces, sampling solution spaces, Flux Variability Analysis, Flux Coupling	6
4. Metabolic Flux Analysis for Biofuels: Network Optimization in Matlab, Flux balance analysis (FBA), dynamic flux balance analysis (DFBA), ¹³ C Metabolic Flux Analysis (¹³ C MFA)	8
5. Network based pathways to energy production: Bioethanol, Butanol, fatty acids, Bisabolene	4
6. Improving microbial production of Biofuels: genetically modified organisms and its comparison with wild type, gene knockout, pathway amplification, biofuels cytotoxicity, metabolic flux visualization, experimental data depot	8
7. Quantitative methods for biofuels: Principal Component Analysis, clustering methods, regression with ANOVA, Genetic Algorithm	6
TOTAL	42

Professor Pralay Mitra is responsible for teaching Module 1 & 8, Total lectures: 10

Professor Amit Ghosh is responsible for teaching Module 2, 3, 4, 5, and 7, Total Lectures: 32