



ENZYME SCIENCES AND TECHNOLOGY

PROF. TRIVEDI

Department of Biosciences and Bioengineering
IIT Guwahati

INTENDED AUDIENCE: UG/PG

PREREQUISITES: Basic Biochemistry

INDUSTRY SUPPORT: Biocon <https://www.biocon.com/>
Jubilant Life Sciences www.jubl.com/
Shantha Biotechnics Ltd Panacea Biotec Dr. Reddy's laboratories

COURSE OUTLINE :

In the current MOOCs course I have put effort to discuss different aspects of enzymology for engineer graduate students as well as MSc students. Enzyme play pivotal role in running different types of metabolic reactions, converting toxic substances into non-toxic products and they are essential for running several physiological processes. 1. Basics understanding of enzyme structure and functions, its production through different types strategies, purification etc. 2. Understanding different approaches to study the interaction of substrate with enzymes, enzyme assay and kinetics. 3. Broad over-view of different approaches to design inhibitors against enzyme, understanding the enzyme-inhibitor kinetics and mode inhibition. 4. Role of enzyme in cell metabolism, physiology and application of enzymes.

ABOUT INSTRUCTOR :

Prof. Trivedi did his Ph.D. from Central Drug Research Institute, Lucknow in the field of Structural Biology. From his postdoctoral research at the Department of Molecular and Cellular Biology, Harvard University and Molecular Oncology Research Institute, Tufts University, Boston, USA, he gained extensive research experience in the field of cell biology, intracellular signal transduction, and immunology. Currently, his laboratory at Department of Biosciences and Bioengineering has an active group working and exploring questions related to malaria parasite biochemistry, the role of novel proteins, development of anti-malarial agents, and lastly understanding factors playing a crucial role in immunomodulation and host pathology in different organs.

COURSE PLAN :**Week 1:** Introduction to Enzymes

Lecture 1: Introduction

Lecture 2: Classification and Nomenclature of enzymes (Part 1)

Lecture 3: Classification and Nomenclature of enzymes (Part 2)

Week 2: Structure of enzyme

Lecture 4: Enzyme Structure (Part 1)

Lecture 5: Enzyme Structure (Part 2)

Lecture 6: Enzyme Structure (Part 3)

Week 3: Enzyme Production (Part 1)

Lecture 7: Cloning of Enzyme (Part 1)

Lecture 8: Cloning of Enzyme (Part 2)

Lecture 9: Over-expression in Host

Week 4: Enzyme Production (Part 2)

Lecture 10: Extraction of enzyme

Lecture 11: Purification Strategies (Part 1)

Lecture 12: Purification Strategies (Part 2)

Week 5: Enzyme Production (Part 3)

Lecture 13: Purification Strategies (Part 3)

Lecture 14: Purification Strategies (Part 4)
Lecture 15: Enzyme Characterization Approaches

Week 6: Enzyme catalyzed Biochemical reactions

Lecture 16: Enzyme Catalyzed reactions (Part 1: Carbohydrate Metabolism)
Lecture 17: Enzyme Catalyzed reactions (Part 2: Lipid and Protein Metabolism)
Lecture 18: Enzyme Catalyzed reactions (Part 3: Detoxification)

Week 7: Enzyme-Substrate interaction

Lecture 19: Enzyme-Substrate interaction (Part 1: Spectroscopic approaches)
Lecture 20: Enzyme-Substrate interaction (Part 2: Isothermal Calorimetry)
Lecture 21: Enzyme-Substrate interaction (Part 3: Surface plasma resonance)

Week 8: Enzyme assay system and Kinetics

Lecture 22: Enzyme assay system
Lecture 23: Enzyme Kinetics (Part 1)
Lecture 24: Enzyme Kinetics (Part 2)

Week 9: Enzyme Inhibitor Designing

Lecture 25: Inhibitor designing (Part 1: Traditional approach)
Lecture 26: Inhibitor designing (Part 2: Modern approach)
Lecture 27: Inhibitor designing (Part 3: Computational approaches)

Week 10: Enzyme Inhibition kinetics

Lecture 28: Enzyme Inhibition kinetics (Part 1)
Lecture 29: Enzyme Inhibition kinetics (Part 2)
Lecture 30: Enzyme Inhibition kinetics (Part 3)

Week 11: Enzyme Applications (Part 1)

Lecture 31: Enzymes in Industrial setup (Part 1)
Lecture 32: Enzymes in Industrial setup (Part 2)
Lecture 33: Enzymes in catalyzing chemical reactions

Week 12: Enzyme Applications (Part 2)

Lecture 31: Enzymes in medical field
Lecture 32: Enzymes in environment field
Lecture 33: Enzymes in drug discovery