

Title: Advanced Enzymology [3-0-0-6]

Pre-requisites, if any: BB101 or equivalent knowledge in biology

Content (*List of the topics/sub-topics to be covered in the lectures/practicals/assignments*):

Rate equation and biological catalyst. Historical perspectives. Organic reactions in biology.

Basic and advanced level enzyme kinetics: derivation of kinetic equations, kinetic constants, kinetic data analysis, Kinetics of enzyme regulations, in-vivo enzymology, enzyme mechanism in details.

Structure-function relationship in enzymes: active site, transition state stabilization, product release, substrate and product tunneling, oligomeric states and their implications in regulation of enzyme activities, modern structural biology techniques in enzymology.

Drug development targeting enzymes: enzymes as drug targets, TS analysis, substrates and transition states binding to the active site, inhibitor design, drug screening.

Enzyme engineering: rationale design and directed evolution, bioinformatics approaches, computational biology, in-silico enzyme engineering, protein to enzyme, development of enzymes with new functions.

Industrial enzymology: importance of enzymes in the industries, industrial enzymes, enzyme immobilization, downstream processing, enzyme production and manufacturing, diagnostic enzymology.

Texts / References:

- ENZYMES: Catalysis, Kinetics and Mechanisms by N. S. Punekar, Springer; 2018
- Fundamentals of Enzymology by Price Nicholas C. and Lewis Stevens, Oxford University Press; 3rd edition, 1999
- Enzymatic reaction mechanisms by C. Walsh. WH Freeman, San Francisco, 1979.
- Enzyme Kinetics and Mechanism by Paul F. Cook and W. Wallace Cleland, Garland Science, 2012
- Enzyme Kinetics by I. Segel. Wiley Interscience, NewYork, 1993.
- An introduction to enzyme and coenzyme chemistry by T. Bugg 2nd Ed., Blackwell Publishers, Oxford, 2004.
- Enzyme Kinetics: Principles and Methods by H. Bisswanger Translated by L. Bubenheim. Wiley-VCH Verlag GmbH, Weinheim, Germany, 2002.
- Fundamentals of Enzyme Kinetics by A. Cornish-Bowden 3rd Edition, Portland Press, London, 2004.