Biocatalysis in organic synthesis - Web course

COURSE OUTLINE

- **Module1:** Introduction to biocatalysis & biotransformation (1), Methods for new biocatalyst discovery (1), Enzyme assay (2), Purification and characterization of enzymes (2), Practical experimental methods for biotransformations (1).
- **Module 2** : Enzyme nomenclature (1), Immobilization of enzymes (1), Catalytic role of enzymes (4).
- **Module 3**: Retrosynthetic biocatalysis (1); Enzymes in functional group transformation (16)
- **Module 4:** White biotechnology (10)

COURSE DETAIL

Lecture	Main Topic	Subtopics
1	Introduction	An historical background to biocatalysis using enzymes and micro-organisms
2	Methods for new biocatalyst discovery	Origins of enzymes, microbial/plant/animal enzymes, screening methods (random screening and metagenomic approach)
3-4	Enzyme assay	Qualitative and quantitative assays, Highthroughput screening systems, Industrial perspective of enzyme assays, Enzyme finger printing
5-6	Enzyme	Different chromatographic

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Chemistry and Biochemistry

Pre-requisites:

- Biochemistry
- General Organic Chemistry

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	purification and characterization	methods
7	Experimental methods	Experimental set up for an ideal biotransformation step
8	Enzyme nomenclature	IUBMB system for enzyme classification and nomenclature
9	Immobilization of enzymes	Methods of immobilization (adsorption, covalent attachment, entrapment & Encapsulation)
10-13	Catalytic role of enzymes	Enzyme structure and function, co-factors and co-enzymes, Different mode of enzyme mechanisms (proximity effect, nucleophilic catalysis, GABC etc.)
14-30	Enzymes in functional group transformation	Functional group interconversion using enzymes (hydrolysis reaction, oxidation/reduction reactions, C-C bond formations), Retrosynthetic biocatalysis, Chemoenzymatic synthesis of natural products
31-40	White biotechnology	Few industrial process using enzymes for production of drugs, fine chemicals and chiral intermediates.

References:

1. Biotransformations in organic chemistry. Kurt Faber . Springer (ISBN : 3-540-66334-7).
2. Enzyme catalysis in organic synthesis (Vol I-III); Eds by K. Drauz and H. Waldmann. Willey-VCH (ISBN: 3-527-29949-1)
3. Hydrolases in organic synthesis (regio and stereoselective biotransformations). U. T. Bornscheuer

and R. J. Kazlauskas. Willey-VCH. (ISBN: 3-527-30104-6).

4. Stereoselective biocatalysis. Ed. R.N. Patel. Marcel Dekker. (ISBN: 0-8247-8282-8)

5. Introduction to biocatalysis using enzymes and microorganisms. Stanley Roberts, N J Turner, A Willetts, M Turner. Cambridge university press (ISBN: 0-521-43685-0)