20CY210 STEREO-SELECTIVE ORGANIC SYNTHESIS

Hours Per Week :

L	T	P	C
4	-	-	4

Course Description and Objectives:

This course offers students the knowledge of chirality transfer using some of the important optically active molecules. This would make aware student the use of chiral pool approach in induction of chirality for an organic reaction involving generation of a stereo center. This also includes the use of modern asymmetric reagents and catalysts in controlling the stereoselectivity of the reaction. Concepts of HOMO, LUMO and SOMO will be taught under organocatalysis with relevance to biological activity of few API in pharmaceutical industry.

Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes
1	Apply the concepts of chirality to understand the optical activity for organic molecules with multiple chiral centers..
2	Apply the concept of chiral pool approach and chiral auxillaries to induct and control chirality in an organic reaction.
3	Apply well established chiral catalyst and examine the stereo- outcome of the reaction.
4	Analyze and apply the concepts of enamine, imine, dienamine, trienamine to catalyse an organocatalytic reaction using small organic molecules.
5	Apply the knowledge of asymmetric approach towards synthesis of bioactive compounds.

UNIT - I :

Optically Active molecules and Rings Forming Reactions– Optical activity of chiral compounds having 2,3 and multiple sterocenters. resolution of BINOL, BINAM, and other molecules. Baldwin ring closure rules, formation of 3,4,5 and 6 membered rings.

UNIT - II :

Induction of Chirality using Chiral Auxiliaries: Chiral pool approach, Acyclic stereoselection: reactions at á-and â-positions of a chiral center. Auxillary controlled stereoselection: Evan's oxazolidones, Oppolzer sultams, Mayer's amides, Ender's RAMP/SAMP, Shollkopf.

UNIT - III :

Asymmetric Catalytic Reactions: Enantioselective alkylation allylation and crotonylation reactions. Asymmetric oxidation [epoxidation (Sharpless, Jacobsen, Shi), dihydroxylation (Sharpless)], reduction (Noyori, Corey, Pfaltz), Asymmetric MBH Reaction, Asymmetric Aldol Reaction

UNIT - IV :

Organocatalysis: Organocatalyzed asymmetric synthesis, Concept of Enamine, Dienamine, Triene, HOMO, LUMO, SOMO catalysis, Desymmetrization, Kinetic resolution reactions, Singh's Aldol Catalyst, Ramachary Reductive coupling.

UNIT - V :

Asymmetric synthesis of Bioactive Compounds: Selected Examples of Optically active Bioactive compounds, in pharmaceutical industry, Asymmetric approach, Application of the above methods in synthesis of selected biologically relevant molecules.

Text Books :

1. M. Nogrady, Stereoselective Synthesis: A Practical Approach, Wiley, 2008.
2. E. M. Carreira, L. Kvaerno Classics in Stereoselective Synthesis, Wiley-VCH: Weinheim, Germany, 2009.

Reference Books :

1. Berkessel, A.; Gröger, H. *Asymmetric Organocatalysis: From Biomimetic Concepts to Applications in Asymmetric Synthesis*, Wiley-VCH, Weinheim, **2005**.
2. Dalko, P. I. *Enantioselective Organocatalysis*, Wiley-VCH, Weinheim, **2007**..