

Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NCYC524	Photochemistry & Pericyclic reactions	3	1	0	4

### Course Objective

- To impart knowledge of pericyclic and photochemical reactions based on the preceding literature so that the student can use them as tools for designing and synthesizing compounds.

### Learning Outcomes

- Prediction of the modes of the pericyclic reactions and the stereochemical implications using the theories of pericyclic reactions.
- Design of synthetic routes towards small molecules based on pericyclic reactions as key step.
- Understanding of the fundamental aspects of photochemical reactions.
- Designing of moderately complex molecular frameworks and functionalizations based on photochemical reactions.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Pericyclic Reaction: Definition and classification of pericyclic reactions; Theory of pericyclic reactions; FMO approach, OCD, Aromatic TS concept. Electrocyclic reactions: stereochemical aspects and applications in organic synthesis. Sigmatropic reactions: stereochemical aspects and application in organic reactions.	14L+5T	To gain knowledge of the theoretical basis of Pericyclic reactions and prediction of the allowed and forbidden Pericyclic process. Application of the theories for rationalization of the stereochemical outcomes of allowed pericyclic processes. Knowledge of the published literature on the class of reactions. Designing new synthesis of target molecules based on the knowledge gained from previous examples.
2	Cycloaddition reactions: 4n and 4n+2 systems, ketenes and allenes; stereochemical aspects and application in organic synthesis. Group transfer and chelotropic reactions.	12 L+4T	Knowledge of the published literature on the class of reactions. Designing new synthesis of target molecules based on the knowledge gained from previous examples.
3	Photochemistry: Photochemical reactions; determination of reaction mechanism; photochemistry of alkenes, carbonyl compounds, enones and aromatic compounds. Reactions of anilides.	10 L+3T	General knowledge of the requirements for molecules to be capable of photochemical reactions. Experimental set-up required for photochemical processes. Knowledge on the general aspects and patterns of the photochemical reactivities associated with different chromophores, literature examples and rationalization of reactivity patterns. Use of the knowledge gained to design new synthesis of molecules using photochemical reactions.
4	Photochemical Rearrangements,	6 L+2T	Knowledge of the prior literature on

	Lumiketone rearrangement, Type A and Type B rearrangement, Di-pi-methane rearrangement, Oxa-di-pi-methane rearrangement, Barton reaction, reaction of hypohalites, Photo-Fries rearrangement. Photoinduced electron transfer (PET) reactions. Photoredox catalysis.		the topics, rationalization of observed phenomena and use the classes of reactions for designing new synthesis of compounds.
<b>Total</b>		<b>42L+14T</b>	

**Text Books:**

1. Organic chemistry– J. Clayden, N. Greeves, S. Warren and P. Wothers 2<sup>nd</sup> Edition Oxford Press, 2012.
2. Frontier Orbitals and Organic Chemical Reactions, I. Flemming, Wiley, London, 1976.
3. Photochemistry of organic compounds, PetrKlan, Jakob Wirz, 1<sup>st</sup> Edition, Wiley, 2009.

**Reference Books:**

1. Modern Molecular Photochemistry of Organic Molecules, Nicholas J. Turro, V. Ramamurthy, J. Scainao, University Science Books; 2010.