

Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NCYC518	Methods in Organic Synthesis	3	0	0	3

### Course Objective

- Knowledge on various organic reactions by Functional Group transformation.
- Gather information about various name reactions.
- New synthetic tools applied in organic synthesis.
- Chasing the synthesis of complex molecular architecture by means of developing new synthetic methods

### Learning Outcomes

- Knowing various reagents for task specific organic transformations.
- Logical utilization of reagent based chemistry in organic synthesis.
- Strategic application of catalysis in organic synthesis.
- Design of green organic synthesis by using environmentally benign reagents.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	<p><b>Oxidation:</b> Different oxidative processes, Oxidation of hydrocarbons, alcohols, carbonyl compounds and amines. Asymmetric Epoxidation and Dihydroxylation (Sharpless, Shi, Jacobsen-Katsuki), Hypervalent iodine reagents, Wacker oxidation.</p> <p><b>Reduction:</b> Different reductive processes, Reduction of hydrocarbons, carbonyl compounds, nitro compounds. Reduction with hydride and modified hydride transfer reagents, Asymmetric Reduction (CBS Reduction), Reduction with SET reagent (Birch reductions, Titanocene dichloride, Samarium (II) Iodide, Photoredox Catalysis).</p>	17L	Students will learn different kinds of oxidative reactions and their applications in organic synthesis.

2	<b>C-C and C-N bond formations through coupling reactions:</b> Heck, Suzuki, Stille, Sonogoshira, Negishi, Kumada, Hiyama, Tsuji-Trost, Olefin metathesis, McMurry and Buchwald-Hartwig amination. C-H activation and functionalization.	8L	Upon successful completion of this course, the student will be able to understand various important aspects, basic mechanisms and different transition metals used in cross coupling reactions and how such cross-coupling reactions are vastly used in pharmaceutical drugs.
3	<b>Organoboron chemistry:</b> Hydroboration, Synthesis and reactions of organoboranes, Unsaturated hydrocarbon synthesis, alkylboranes, allylenolates. <b>Organosilicon chemistry:</b> $\alpha$ - and $\beta$ - effects, hydrosilylation, synthesis and reactivity of vinylsilanes, allylsilanes.	9L	Student will gain a brief knowledge about the organoborane and organosilicon chemistry applied in organic synthesis.
4	<b>Organophosphorus chemistry:</b> Phosphorus ylides, Wittig reaction and its modifications; phosphine oxides and its applications. <b>Organosulfur chemistry:</b> Sulfur-stabilization of anions and cations, sulfur ylides, sulfoxides and sulfones.	8L	Students will learn the different reactivities of organophosphorous and organosulfur reagents, and there by application of these reagents in synthesis of molecules.
Total		42L	

#### Text Books:

1. Organic Chemistry: Jonathan Clayden, Nick Greeves and Stuart Warren. 2<sup>nd</sup> Edition, Oxford University Press, 2014
2. W. Carruthers and I. Coldham, Modern Methods of Organic Synthesis, Cambridge University Press, 2005
3. Roderick Bates, Organic Synthesis using Transition Metals, 2nd Edition, Wiley, 2012
4. George S. Zweifel, Michael H. Nantz, Peter Somfai. Modern Organic Synthesis: An Introduction, 2<sup>nd</sup> Edition, Wiley Publisher, 2017

#### Reference Books:

1. Strategic Applications of Named Reactions in Organic Synthesis, L. Kürti and B.Czakó Elsevier Academic Press, 2005.
2. Name Reactions and Reagents in Organic Synthesis, B.P.Mundy, M.G.Ellerd and Jr. F. G.Favaloro, 2nd Edition, Wiley- Interscience, 2005.
3. Advanced Organic Chemistry Part B, Reactions and Synthesis F.A. Carey and R.J. Sundberg, 5th Edition, Springer, 2008