

**Programme: M. Sc. Part-I (Chemistry)**

**Course Code: OCO-401**

**Title of the Course: Synthetic Organic Chemistry I**

**Number of Credits: 03**

**Effective from AY: 2018-19**

<b>Prerequisites for the course:</b>	Should have studied the courses / topics in Organic Chemistry at F Y B Sc, S Y B Sc and T Y B Sc levels as well as the course CHOC-401 so as to have basic knowledge of organic nomenclature and basic principles.	
<b>Course Objectives:</b>	1. Introduction to concepts of functional groups and their interconversion 2. Learning mechanistic concepts of carbon-carbon bond making by nucleophilic addition to carbonyl group 3. Learning mechanistic aspects of various oxidation & reduction processes used in organic syntheses.	
<b>Course Outcomes:</b>	1. Students should be in a position to choose appropriate oxidizing agent for oxidation of a particular functional group. 2. Students should be in a position to choose appropriate reducing agent for reduction of a particular functional group. 3. Students shall be in a position to understand/propose plausible mechanism of organic reactions. 4. Student should be able to choose appropriate nucleophilic addition reaction for making carbon-carbon bond.	
<b>Content:</b>	<p><b>1. Oxidation reactions:</b> Oxidation of organic compounds using chromium (PCC, PDC) and manganese compounds, Oppenauer oxidation, Swern oxidation, ozonolysis. Other methods of oxidation such as selenium dioxide, Pb(OAc)<sub>4</sub>, HIO<sub>4</sub>, peracids, peroxides, OsO<sub>4</sub>, RuO<sub>4</sub>, DMSO (Swern) sodium bromate / CAN &amp; NaOCl, DDQ, Prevost's reagent and Woodward Conditions; Catalytic oxidation over Pt, Photosensitised oxidation of alkenes, oxidation with molecular oxygen, aromatization, silver based reagents.</p> <p><b>2. Reduction reactions:</b> Reduction of organic compounds using hydride-transfer reagents and related reactions : MPV reduction, NaBH<sub>4</sub>, Trialkylborohydrides, LAH &amp; lithium hydridoalkoxyaluminates, mixed LAH-AlCl<sub>3</sub> reagents, DIBAL and reduction with borane and dialkylboranes, Enzymatic reduction involving liver alcohol dehydrogenase/NADH &amp; Bakers' yeast, catalytic hydrogenation, Dissolving metal reductions including acyloin condensation, Clemmensen reduction and Birch reduction, Other methods of reduction: Wolff-Kishner, Raney Ni desulphurisation, di-imide.</p> <p><b>3. Halogenation:</b> Formation of Carbon Halogen bonds: Substitution in saturated compounds, alcohols, carbonyl compounds, substitution at allylic and benzylic compounds, bromodecarboxylation (Hunsdiecker reaction), Finkelstein reaction, iodolactonisation.</p>	<p>11 hrs</p> <p>9 hrs</p> <p>5 hrs</p>

	4. <b>Esterification, amide preparation and hydrolysis:</b> (study of different mechanisms and reagents)	6 hrs
	5. <b>Name reactions:</b> Knoevenegel Reaction, Claisen, Darzen, Stobbe, Perkin, Aldol, Benzoin, Pechmann condensation.	5 hrs
<b>Pedagogy:</b>	Mainly Lectures & tutorials. Seminars / assignments / presentations / self-study or a combination of some of these could also be used to some extent.	
<b>References/ Readings</b>	<ol style="list-style-type: none"> <li>1. H. O. House, <i>Modern Synthetic Reactions</i>, 2<sup>nd</sup> Ed., W. A. Benjamin, Benjamin-Cummings Publishing Co., 1972.</li> <li>2. W. Caruthers, <i>Modern Methods of Organic Synthesis</i>, 4<sup>th</sup> Ed., Cambridge University Press, 2004.</li> <li>3. M. B. Smith, Jerry March, <i>Advanced Organic Chemistry- Reaction, Mechanism and Structure</i>, 6 Ed, Wiley, 2006.</li> <li>4. F.A. Carey &amp; R.J. Sundberg, <i>Advanced Organic Chemistry (Part A &amp; B)</i> 5<sup>th</sup> Ed., Springer India Private Limited, 2007.</li> <li>5. P Sykes, <i>A guidebook to mechanisms in organic chemistry</i>, 6<sup>th</sup> Ed., Pearson Edu., 1996.</li> <li>6. Clayden, Greeves, Warren and Wothers, <i>Organic Chemistry</i>, 2<sup>nd</sup> Ed., Oxford University Press, 2002.</li> <li>7. E.S. Gould, <i>Mechanism and structure in Organic Chemistry</i>, Holt, Reinhart and Winston 1965.</li> <li>8. F. A. Carey, R. M. Giuliano, <i>Organic Chemistry</i>, 8<sup>th</sup> Ed., McGraw-Hill, 2010.</li> <li>9. S.H. Pine, <i>Organic Chemistry</i>, 5th Ed, McGraw-Hill International Edn. McGraw-Hill, 1980.</li> </ol>	