Faculty of Science and Humanities
M.Sc.(Chemistry)Semester-II
Effective from AcademicYear2026-27

Branch Name:	M.Sc. Chemistry
Program Code:	SC203
Course Name:	Modern Organic Chemistry
Course Code:	2SC2030202
Pre-requisite Course:	Basic organic chemistry up to B.Sc.

Course Objectives:

- To develop a comprehensive understanding of stereochemistry.
- To gain in-depth knowledge of selected reducing and oxidizing reagents.
- To understand the structure, stability, generation, and reactivity of important reaction intermediates.
- To explore fundamental principles and synthetic applications of photochemistry.

Teaching and Examination Scheme:

Teaching Scheme(Hours per week)					Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit		Theory (Marks)		Practical (Marks)		Total (Marks)
			T	P	University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
4	-	-	4	-	50	50	-	-	100

Subject Contents:

Unit	Contents	Lecture	Weightage
1	**Stereochemistry** Concept of chirality, chirality and symmetry, elements of chirality including chiral center, chiral axis, chiral plane and helicity, CIP nomenclature, molecules with more than one chiral center, total number of stereoisomer in such molecules, enantiomeric and diastereomeric relationship, chirogenicity and stereogenecity, pseudo chirality, topicity and pro-stereoisomerism, determination of topic relationship between homomorphic ligands in intact molecules, optical activity in the absence of chiral carbon(biphenyls, allenes and spiranes)	12	25%
2	**Selected reducing reagents in organic synthesis:** $Al(O\text{-}iPr)_3$, Zn/HCl, N_2H_4/OH, $NaBH_4$, $LiAlH_4$, complex hydrides, Na/NH_3, Cat.H_2 ,TBTH. **Selected oxidizing reagents in organic synthesis:** CrO_3, MnO_2, $KMnO_4$, SeO_2, $Pb(OAc)_4$, OsO_4, HIO_4, DMSO, H_2O_2, CH_3COOAg (Dry & wet), peracid, Ozone, HgO, NBS, $K_3Fe[CN]_6$, DDQ, $Al(O\text{-}t\text{-}Bu)_3$.	12	25%
3	**Reaction intermediates** Introduction, General structure, stability, methods of preparation, and reactions of carbocation, carbanion, free radical, carbene, and nirene and their applications.	12	25%

4	**Photochemistry** Photochemical reactions, Principle of energy transfer, electronic excitation (Jablonski diagrame), Photosensitization, Photochemistry of carbonyl compounds, Norrish type-I and II, reaction of cyclic ketones, Peterno-Buchi reaction, Di-π methane rearrangement, dienone photochemistry, cis-trans isomerization, Photochemistry of conjugated dienes, photo rearrangement. Barton reaction.	12	25%

Text Books:

1. Advanced organic chemistry by Jagdamba singh, LDS Yadav published by pragati prakashan.

Reference Books:

1. Advanced organic chemistry part-A F.A.Carey and R.G.Sundbreg.
2. Organic Reaction Mechanisms, 4/Ed. V.K. Ahluwalia & Rakesh K. Parashar.
3. Organic chemistry by J. Clayden, Oxford University Press.
4. Organic chemistry by R.T. Morrison and R.N. Boyd, Prentice-Hall.

List of Open Source Software/learning website:

1. https://nptel.ac.in/courses/104105086
2. https://nptel.ac.in/courses/104103111
3. https://nptel.ac.in/courses/104105104
4. https://nptel.ac.in/courses/104105038

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Explain and apply stereochemical principles including chirality, symmetry, CIP rules, stereoisomer enumeration, and stereochemical relationships in complex organic molecules.	2. Understanding 3. Applying
CLO2	Predict reaction outcomes using selected reducing and oxidizing reagents, justifying reagent choice based on mechanism, chemo selectivity, and functional group compatibility.	3. Applying 4. Analyzing
CLO3	Analyze the structure, stability, and reactivity of reaction intermediates such as carbocations, carbanions, free radicals, carbenes, and nitrenes in organic transformations.	4. Analyzing
CLO4	Understand and apply principles of photochemistry, including electronic excitation, energy transfer, and major photochemical reactions such as Norrish reactions and rearrangements.	2. Understanding 4. Analyzing
CLO5	Solve advanced mechanistic problems and design synthetic strategies integrating stereochemical concepts, reaction intermediates, redox reagents, and photochemical processes.	3. Applying

Mapping of CLO with PO and PSO

Course Learning Outcomes	Program Outcomes (POs)																PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1	2
CLO1	3	2	1		1				1								2	1
CLO2	2	1	1		2	2											3	2
CLO3	1	2	1		2	1											1	2
CLO4	2	1	1	1	1	1											3	2
CLO5	1	2	2	1	2	2			1			1	1				2	1

3:High, 2:Medium, 1:Low