जम्मू केंद्रीय विश्वविद्यालय
CENTRAL UNIVERSITY OF JAMMU
रसायन शास्त्र एवं रासयानिक बिज्ञान
DEPARTMENT OF CHEMISTRY AND CHEMICAL SCIENCES
राया-सूचानी (बागला), जिला सांबा-181143, जम्मू, जम्मू एवं कश्मीर
Rahya-Suchani (Bagla), District Samba-181143, Jammu, Jammu & Kashmir

Five-year Integrated M.Sc. Chemistry
Teaching Plan (August-Dec 2022)

Semester: III
Course: Organic Chemistry-II (ICCHM3C007T)
Course Teacher: Dr. Princy Gupta

Week	Lecture No./Day	Topic to be Taught	No of Hours	Suggested Readings
1st Week	I	**Alkanes**: Nomenclature	1	1, 2, 3, 4, 5, 6
	II	Formation of alkanes, Corey House reactions, Decarboxylation of carboxylic acids	1	1, 2, 3, 4, 5, 6
	III	Wurtz Reaction, Wurtz-Fittig Reaction	1	1, 2, 3, 4, 5, 6
	IV	Free-radical halogenation of alkanes, Relative reactivity and selectivity	1	1, 2, 3, 4, 5, 6
2nd Week	I	**Cycloalkanes**: Nomenclature	1	1, 2, 3, 4, 5, 6
	II	Methods of preparations, Types of cycloalkanes and their relative stability	1	1, 2, 3, 4, 5, 6
	III	Bayer's strain theory and its limitations, Ring strain in cyclopropane and cyclobutanes	1	1, 2, 3, 4, 5, 6
	IV	Ring inversion of cyclohexane with energy diagrams, Relative stability of chair, boat and twist boat forms	1	1, 2, 3, 4, 5, 6
3rd Week	I	**Alkenes**: Nomenclature of alkenes	1	1, 2, 3, 4, 5, 6
	II	Formation of alkenes by elimination reactions: Dehydration, dehydrohalogenation and dehalogenation	1	1, 2, 3, 4, 5, 6
	III	Mechanisms of E1 reactions	1	1, 2, 3, 4, 5, 6
	IV	Mechanisms of E2 reactions	1	1, 2, 3, 4, 5, 6
4th Week	I	Mechanisms of E1cB reactions, Regioselectivity	1	1, 2, 3, 4, 5, 6
	II	Saytzeff rule, Hoffmann elimination	1	1, 2, 3, 4, 5, 6
	III	Electrophilic additions and their mechanisms (Markovnikov/Anti-Markovnikov addition)	1	1, 2, 3, 4, 5, 6
	IV	Contd.	1	1, 2, 3, 4, 5, 6

5th Week	I	Hydroboration-oxidation	1	1, 2, 3, 4, 5, 6
	II	Epoxidation, Ozonolysis	1	1, 2, 3, 4, 5, 6
	III	*syn*- and *anti*-Hydroxylation	1	1, 2, 3, 4, 5, 6
	IV	Oxymercuration-demercuration, Hydrogenation	1	1, 2, 3, 4, 5, 6
6th Week	I	Polymerization	1	1, 2, 3, 4, 5, 6
	II	**Dienes and Cycloalkenes**: Nomenclature and classification of dienes: Isolated, conjugated and cumulated dienes	1	1, 2, 3, 4, 5, 6
	III	Structure of allenes and butadiene	1	1, 2, 3, 4, 5, 6
	IV	Methods of formation, Polymerization, 1,2- and 1,4-addition reactions of conjugated dienes	1	1, 2, 3, 4, 5, 6
7th Week	I	Diels-Alder reaction	1	1, 2, 3, 4, 5, 6
	II	Methods of formation and chemical reactions of cycloalkenes	1	1, 2, 3, 4, 5, 6
	III	**Alkynes:** Nomenclature, Structure and bonding in alkynes	1	1, 2, 3, 4, 5, 6
	IV	Methods of formation, Acidity of alkynes	1	1, 2, 3, 4, 5, 6
8th Week	I	Chemical reactions of alkynes	1	1, 2, 3, 4, 5, 6
	II	Mechanism of electrophilic and nucleophilic addition reactions	1	1, 2, 3, 4, 5, 6
	III	Hydration to form carbonyl compounds	1	1, 2, 3, 4, 5, 6
	IV	Hydroboration-oxidation, Metal-ammonia reductions	1	1, 2, 3, 4, 5, 6
9th Week	I	Oxidation and polymerization	1	1, 2, 3, 4, 5, 6
	II	Contd.	1	1, 2, 3, 4, 5, 6
	III	**Carbonyl compounds I:** Nomenclature, Structure of the carbonyl group	1	1, 5, 6, 7, 8
	IV	Synthesis of aldehydes and ketones: Oxidation of alcohols	1	1, 2, 3, 4, 5, 6
10th Week	I	Oppenauer oxidation, Synthesis from acid chlorides, Rosenmund reduction	1	1, 2, 3, 4, 5, 6

	II	Friedel-Crafts reaction, Synthesis of aldehydes and ketones using 1,3-dithianes	1	1, 2, 3, 4, 5, 6
	III	Synthesis of ketones from nitriles and from carboxylic acids,	1	1, 2, 3, 4, 5, 6
	IV	Reaction of carbonyl compounds Nucleophilic addition to carbonyl group	1	1, 2, 3, 4, 5, 6
11th Week	I	Mechanism of Aldol, Benzoin condensation	1	1, 2, 3, 4, 5, 6
	II	Knoevenagel condensations, Perkin reaction Cannizzaro	1	1, 2, 3, 4, 5, 6
	III	Claisen-Schmidt reactions	1	1, 2, 3, 4, 5, 6
	IV	Wittig reactions	1	1, 2, 3, 4, 5, 6
12th Week	I	Baeyer-Villiger oxidation	1	1, 2, 3, 4, 5, 6
	II	Benzil-Benzilic acid	1	1, 2, 3, 4, 5, 6
	III	Beckmann rearrangements, MPV	1	1, 2, 3, 4, 5, 6
	IV	Clemmensen reaction	1	1, 2, 3, 4, 5, 6
13th Week	I	Wolff-Kishner reductions	1	1, 2, 3, 4, 5, 6
	II	$LiAlH_4$ reductions	1	1, 2, 3, 4, 5, 6
	III	Contd.	1	1, 2, 3, 4, 5, 6
	IV	$NaBH_4$ reductions	1	1, 2, 3, 4, 5, 6
14th Week	I	Contd.	1	1, 2, 3, 4, 5, 6
	II	Halogenation of enolizable ketones	1	1, 2, 3, 4, 5, 6
	III	α-Substitution reactions	1	1, 2, 3, 4, 5, 6
	IV	Use of acetal as protecting group	1	1, 2, 3, 4, 5, 6
15th Week	I	Contd.	1	1, 2, 3, 4, 5, 6
	II	Introduction to α,β-unsaturated carbonyl compounds, Michael addition	1	1, 2, 3, 4, 5, 6
	III	Revision of Unit I	1	

	IV	Revision of Unit II	1	
16th Week	I	Revision of Unit III	1	
	II	Revision of Unit IV	1	
	III	Revision of Unit V	1	
	IV	Discussion of model question papers	1	

REFERENCES

1. R. T. Morrison, R. N. Boyd and S. K. Bhattacharjee, *Organic Chemistry*, 7th Ed., 2010.
2. T. W. Graham Solomons, *Fundamentals of Organic Chemistry*, John Wilev, 5th Ed., 1998.
3. M. B. Smith, *March's Advanced Organic Chemistry, Reactions, Mechanisms and Structure*, 7th Ed., 2016.
4. L.G. Wade Jr., *Organic Chemistry*, Prentice Hall, 8th Ed., 2012.
5. P. Y. Bruice, *Organic Chemistry*, 7th Ed., 2012.
6. J. Clayden, N. Greeves, S. Warren and P. Wothers, *Organic Chemistry*, Oxford University Press, Oxford, 2001.