



Lahore University of Management Sciences

CHEM 332 – Chemistry of Organic Functional Groups

Fall 2023-24

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Course URL (if any)	

Course Teaching Methodology (Please mention following details in plain text)

If Permitted by the prevailing COVID19 scenario, we will opt for the on-campus, in-person classes.

If the COVID19 scenarios hinders in-person classes, then we will use following strategy

- Teaching Methodology: Synchronous mode of teaching will be used, and the session will be recorded.
- Lecture details: The recorded lectures will be shared with the students for reviewing lectures in async fashion.

Course Basics				
Credit Hours	03			
Lecture(s)	Nbr of Lec(s) Per Week	02	Duration	75 min each
Recitation (per week)	Nbr of Rec (s) Per Week		Duration	
Lab (if any) per week	Nbr of Session(s) Per Week		Duration	
Tutorial (per week)	Nbr of Tut(s) Per Week		Duration	

Course Distribution	
Core	Chemistry majors, Chemical Engineering majors
Elective	SSE students
Open for Student Category	
Closed for Student Category	

COURSE DESCRIPTION

This course is designed to apply the fundamental concepts learned during CHEM 231 to understand more about the important classes of organic compounds. We will first discuss the nomenclature of the organic molecules including bi-functional compounds and then discuss the synthesis and reactions of organic compounds in more detail while explaining the mechanism, orbital interactions and stereochemistry. The applications of such compounds in life sciences and industry will also be discussed.

COURSE PREREQUISITE(S)

•	CHEM 231: Fundamentals of Organic Chemistry
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COURSE OBJECTIVES	
	<ol style="list-style-type: none">1. To give students an overview of the nomenclature of the organic molecules including bi-functional compounds2. To give students a general overview of the structures and reactivity of organic molecules3. To enable students to interpret patterns of reactivity based on mechanistic reasoning4. To enable the students to design short syntheses of given organic molecules of moderate complexity

Learning Outcomes	
	<p>At the end of this course, the students should be able to understand the mechanism and analyze the products of fairly advance organic reactions involving the following concepts:</p> <ol style="list-style-type: none">1. Comprehend the rules of nomenclature of the organic molecules including bifunctional compounds2. Demonstrate the reactivity of carbonyl compounds in nucleophilic addition and substitution and enolate chemistry3. Analyze the stereochemistry of the organic molecule, pericyclic reactions and electrophilic aromatic substitution reactions
Grading Breakup and Policy	
<p>Quizzes: 10 % 2 mid-exams: 60 % (30x2) Final exam: 30 %</p> <p>Instructor has the privilege to change the grading scheme which, if availed, will be conveyed to the students well in time.</p>	

Examination Detail	
Midterm Exam	<p>Yes, two midterms Combine/Separate: Combine Duration: 75 min Exam Specifications: Closed books, Course material in any form is not permitted</p>
Final Exam	<p>Yes Combine/Separate: Combine Duration: 180 min Exam Specifications: Closed books, Course material in any form is not permitted</p>



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COURSE OVERVIEW			
Lectures	Topics	Recommended Readings	Objectives/ Application
1-5	Revision of basic concepts and IUPAC nomenclature of organic compounds	Recommended sections of the textbook (s) + Lecture notes	To revise the fundamental concepts of organic reactions and IUPAC nomenclature of organic compounds
6-7	Nucleophilic addition to the carbonyl group	Textbook chapter 6 + Lecture notes	To apply the fundamental concepts learnt during CHEM231 to more advanced nucleophilic addition reactions to the carbonyl compounds
8-9	Using organometallic reagents to make C-C bonds	Textbook chapter 9 + Lecture notes	To introduce students about the organometallic reagents and their applications to form C-C bonds
10	<i>Mid Exam 1 (for lectures 1-9)</i>		
11-13	Conjugate addition	Textbook chapter 10 + Lecture notes	To familiarize the students with the direct and conjugate addition to unsaturated carbonyl compounds
14-15	Nucleophilic substitution at the carbonyl group	Textbook chapter 12 + Lecture notes	To apply the fundamental concepts learnt during CHEM231 to more advanced nucleophilic substitution reactions of the carboxylic acids and their derivatives
16-17	Stereochemistry	Textbook chapter 16 + Lecture notes	To familiarize students to assign absolute configuration of stereoisomers and its implications in reactivity
18	<i>Mid Exam 2 (for lectures 12-17)</i>		
19-20	Formation and reactions of enols and enolates	Textbook chapter 21 + Lecture notes	To apply the fundamental concepts learnt during CHEM231 to form enolates and their subsequent reactions
21-22	Alkylation of enolates	Textbook chapter 26 + Lecture notes	To apply the fundamental concepts learnt during CHEM231 to more complex aromatic substitution reactions
23-24	Pericyclic reactions	Textbook chapter 35,36 + Lecture notes	To introduce students the basis of color chemistry, its applications in nanobiology and the introduction to pericyclic reactions and the heterocyclic compounds
25-26	Electrophilic aromatic substitution	Recommended sections of the textbook (s) + Lecture notes	To apply the fundamental concepts learnt during CHEM231 to more complex aromatic substitution reactions



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Textbook(s)/Supplementary Readings

Textbooks:

Organic Chemistry by Clayden, Greeves, Warren and Wothers (Edition 2009).

ISBN 978-0-19-850346-0

Others recommended readings:

Organic Chemistry as a 2nd Language, Part – II, by David R Klein

Organic chemistry by TWG Solomons and CB Fryhle (9th Edition); ISBN 978-0-471-68496-1

Organic Chemistry by L. G. Wade Jr. (6th Edition); ISBN 0-13-147871-0