



**Lahore University of Management Sciences**  
**CHEM 231– Fundamentals of Organic Chemistry Fall-2023**

Instructor	Irshad Hussain
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Course URL (if any)	LUMS LMS

Course Teaching Methodology (Please mention following details in plain text)
<ul style="list-style-type: none"><li>Teaching Methodology: synchronous or asynchronous or a blend of both Synchronous</li><li>Lecture details: Percentage of recorded and live interaction lectures All lectures will be delivered in-person unless there is a serious need to deliver lectures virtually</li></ul>

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	Biology, Chemistry and Chemical Engineering
Elective	SBASSE students
Open for Student Category	
Closed for Student Category	

COURSE DESCRIPTION
This course is designed to introduce organic chemistry to Biology, Chemistry and Chemical Engineering sophomore students to discuss the structure and reactivity of the major classes of organic compounds enabling the students to acquire the fundamental knowledge and skills to solve elementary problems in organic chemistry. On completion of this course, students should have the ability to analyze simple organic reactions, predict their mechanisms based on frontier orbitals interaction, and possible products including those that have not explicitly been discussed during the course.

COURSE PREREQUISITE(S)	
<ul style="list-style-type: none"><li></li></ul>	CHEM 101: Principles of Chemistry



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COURSE OBJECTIVES				
	To enable the students to understand and predict the reactivity and mechanism of simple organic chemical reactions by carefully analyzing the structure of the reactants, based on their frontier orbitals interaction. At the end of this course, the students should be able to explain simple organic reactions by identifying the interacting HOMO and LUMO of the reactants, the type of their interaction and the possible products.			
Course Learning Outcomes				
CLO-1	Understanding the structure of organic molecules			
CLO-2	Apply the knowledge acquired in CLO-1 to understand the reactivity of organic molecules			
CLO-3	Apply the knowledge acquired in CLO-1 & CLO-2 to propose mechanism and products of simple organic reactions, including those that are not explicitly discussed during this course, and propose the products			
Program Learning Outcomes (PLO)				
CLOs	Related PLOs	Levels of Learning	Teaching Methods	CLO Attainment checked in
CLO1	PLO1	Cog-1	Class room teaching, office hours, tutorials and assignments	Assignments, mid-term exams, viva voce exams & final exam.
CLO2	PLO1/PLO2	Cog-2	Class room teaching, office hours, tutorials and assignments	Assignments, mid-term exams, viva voce exams & final exam.
CLO3	PLO2	Cog-3	Class room teaching, office hours, tutorials and assignments	Assignments, mid-term exams, viva voce exams & final exam.
Grading Breakup and Policy				
Class participation: 05 % Assignments: 10 % Quizzes: 20 % Mid-term exam: 30 % Final exam: 35 %  Instructor has the privilege to change the grading scheme which, if availed, will be conveyed to the students well in time. If, for any reason, the course goes online, then grading policy will also change.				
Examination Detail				
Midterm Exam (1)	Yes/No: Yes Combine/Separate: Combine Duration: ~02 h Approx. Date: 8 <sup>th</sup> week Exam Specifications: Closed books, course material in any form is not permitted			
Final Exam	Yes/No: Yes Combine/Separate: Combine Duration: ~03 h Exam Specifications: Closed books, course material in any form is not permitted			



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COURSE OVERVIEW			
	Topics	Recommended Readings	Objectives/ Application
Week 1	Period 2 elements and the building blocks of organic molecules	Course package plus recommended sections of the textbook (s)	To know the importance of period 02 elements and draw the building blocks of organic molecules
Week 2	Organic functional groups and their stereochemistry	Course package plus recommended sections of the textbook (s)	To familiarize the students with common organic functional groups and their stereochemistry
Week 3	Resonance and linear combination of atomic orbitals (LCAO)	Course package plus recommended sections of the textbook (s)	To familiarize the students with the concept of resonance and to build molecular orbitals from atomic orbitals
Week 4	Molecular orbital theory and frontier orbital theory	Course package plus recommended sections of the textbook (s)	To familiarize the students with the molecular orbitals and understand the role of frontiers orbitals in organic chemical reactions.
Week 5	Conformations and cycloalkanes	Course package plus recommended sections of the textbook (s)	To familiarize the students of various conformations of molecules, especially cycloalkanes, and understand their reactivity based on their energy/stability.
Week 6	Structure, reactivity and acid-base equilibrium	Course package plus recommended sections of the textbook (s)	To familiarize students of predicting the reactivity of organic molecules based on their structure.
Week 7	Substitution and reactions at $SP^3$ centers	Course package plus recommended sections of the textbook (s)	To familiarize the students of $SN_1$ and $SN_2$ reactions at $SP_3$ carbon atoms.
Week 8	Elimination reactions at $SP^3$ centers	Course package plus recommended sections of the textbook (s)	To familiarize the students of $E_1$ and $E_2$ reactions at $SP_3$ carbon atoms.
Week 9	Addition reactions	Course package plus recommended sections of the textbook (s)	To familiarize students with the addition reactions of unsaturated compounds.
Week 10	Aromatic substitution reactions	Course package plus recommended sections of the textbook (s)	To familiarize students with the reactivity of aromatic compounds specifically the substitution reactions.
Week 11/14	Addition and substitution reactions of carbonyl compounds and their derivatives	Course package plus recommended sections of the textbook (s)	To familiarize students with the reactivity and chemistry of carbonyl compounds

**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 2<sup>nd</sup> Language, Part – I, 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



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**Academic Honesty**

The principles of truth and honesty are recognized as fundamental to a community of teachers and students. This means that all academic work will be done by the student to whom it is assigned without unauthorized aid of any kind. Plagiarism, cheating and other forms of academic dishonesty are prohibited. Any instances of academic dishonesty in this course (intentional or unintentional) will be dealt with swiftly and severely. Potential penalties include receiving a failing grade on the assignment in question or in the course overall. For further information, students should make themselves familiar with the relevant section of the LUMS student handbook.

**Harassment Policy**

SSE, LUMS and particularly this class, is a harassment free zone. There is absolutely zero tolerance for any behavior that is intended, or has the expected result of making anyone uncomfortable and negatively impacts the class environment, or any individual's ability to work to the best of their potential.

In case a differently-abled student requires accommodations for fully participating in the course, students are advised to contact the instructor so that they can be facilitated accordingly.

If you think that you may be a victim of harassment, or if you have observed any harassment occurring in the purview of this class, please reach out and speak to me. If you are a victim, I strongly encourage you to reach out to the Office of Accessibility and Inclusion at [oai@lums.edu.pk](mailto:oai@lums.edu.pk) or the sexual harassment inquiry committee at [harassment@lums.edu.pk](mailto:harassment@lums.edu.pk) for any queries, clarifications, or advice. You may choose to file an informal or a formal complaint to put an end of offending behavior. You can find more details regarding the LUMS sexual harassment policy [here](#).

To file a complaint, please write to [harassment@lums.edu.pk](mailto:harassment@lums.edu.pk).

**SSE Council on Equity and Belonging**

In addition to LUMS resources, SSE's **Council on Belonging and Equity** is committed to devising ways to provide a safe, inclusive and respectful learning environment for students, faculty and staff. To seek counsel related to any issues, please feel free to approach either a member of the council or email at [cbe.sse@lums.edu.pk](mailto:cbe.sse@lums.edu.pk)

**Rights and Code of Conduct for Online Teaching**

Not applicable if the course is conducted in-person, as planned.

If, for any reason, it goes online, then misuse of online modes of communication is unacceptable. TAs and Faculty will seek consent before the recording of live online lectures or tutorials. Please ensure if you do not wish to be recorded during a session to inform the faculty member. Please also ensure that you prioritize formal means of communication (email, LMS) over informal means to communicate with course staff.