Ministry of Higher Education and Scientific Research

Supervision and Scientific Evaluation Department

Quality Assurance and Academic Accreditation Office

General Chemistry Course Description

This description provides a brief overview of the key characteristics of the General Chemistry course and its expected learning outcomes

1. Educational Institution	Shatt Al-Arab University
2. Department / Center	Department of Laser Technology and Optoelectronic Eng.
3. Course Title /Code	General Chemistry
4. Lecturer Name	Assist. Lecturer Murtadha Firas Hasan
5. Type of Teaching	Attendance
6. Academic Year /Term	Term
7. Total No. of Teaching	175 Hours
8. Date of Preparing this Course Description	15/02/2025

1. Course Objectives

• Understand the fundamental principles of General Chemistry, including bonding, structure, and reactivity of organic molecules.

• Illustrate the classification, nomenclature, and stereochemistry of general compounds.

• Develop practical skills in preparing and analyzing organic compounds through various laboratory techniques.

• Explain mechanisms of organic reactions and apply them to solve chemical problems in synthesis and analysis.

2. Course Output, Methodology and Evaluation

(A) Cognitive Objectives

• Achieve a foundational understanding of key concepts in organic chemistry and functional group transformations.

• Comprehend the mechanisms of organic reactions and their synthetic applications.

• Enhance problem-solving skills in predicting reactivity, mechanisms, and synthesis pathways.

• Analyze and evaluate reaction conditions and outcomes based on theoretical and experimental data.

(B) Skill Objectives Related to the Program:

• Analytical Skills: Analyze organic reaction data, interpret spectra, and determine compound structures.

• Problem-Solving Skills: Design synthetic routes and predict reaction outcomes.

• Communication Skills: Present experimental findings, prepare lab reports, and communicate results using scientific terminology.

(C) Methods of Teaching and Learning

• Delivering Pre-Prepared Lectures.

• Assigning Homework.

• Facilitating Group Discussions.

(D) Methods of Evaluation

• Oral Tests

• Monthly Tests

• Daily Quizzes

• Regular Attendance

(E) Sentimental and Value Objectives

• Promoting respect, integrity, and responsibility in scientific work.

• Fostering positive attitudes towards research, collaboration, and ethical laboratory behavior.

(F) General and Qualitative Skills

• Develop leadership skills in laboratory project management.

• Improve proficiency in presenting chemical synthesis and analysis results.

• Develop skills in handling, purifying, and characterizing organic compounds.

• Adapt to new developments in synthetic methodologies and green chemistry.

3. Course Structure

Week	No. of hours	Learning Outcome	Topic/Concept	Teaching Method	Assessment Method
1	3	Introduction to organic chemistry, bonding and structure	Fundamentals of organic chemistry	Lectures	Oral tests
2	3	Classification and nomenclature of organic compounds	Nomenclature rules	Lectures	Oral tests
3	3	Understanding isomerism	Structural and stereoisomerism	Lectures	Oral tests
4	3	Alkanes and cycloalkanes	Structure, properties, and reactions	Lectures	Oral tests
5	3	Alkenes and alkynes	Structure, reactions, and mechanisms	Lectures	Oral tests
6	3	Aromatic compounds	Benzene structure, aromaticity, electrophilic substitution	Lectures	Oral tests
7	3	Alkyl halides	Nucleophilic substitution and elimination reactions	Lectures	Oral tests
8	3	Alcohols, ethers, and phenols	Structure, preparation, and reactions	Lectures	Oral tests
9	3	Aldehydes and ketones	Nucleophilic addition reactions	Lectures	Oral tests
10	3	Carboxylic acids and derivatives	Acidity, preparation, and reactions	Lectures	Oral tests
11	3	Amines	Basicity, preparation, and reactions	Lectures	Oral tests

12	3	Biomolecules	Carbohydrates, lipids, amino acids, proteins	Lectures	Oral tests
13	3	Spectroscopy	IR, NMR, and MS in structure elucidation	Lectures	Oral tests
14	3	Organic reaction mechanisms	Radical, electrophilic, and nucleophilic mechanisms	Lectures	Oral tests
15	3	Green chemistry and modern trends	Applications in sustainable chemistry	Lectures	Oral tests
16	3	Course review and preparation for exam	Revision of key concepts	Lectures	Oral tests

4. Lab Structure

Week	No. of Hours	Experiment / Material Covered
1	4	Introduction to organic lab safety and glassware
2	4	Purification: Recrystallization and melting point determination
3	4	Distillation techniques (simple and fractional)
4	4	Preparation of an alkyl halide
5	4	SN1 and SN2 substitution reactions
6	4	Preparation and reactions of alcohols
7	4	Preparation and reactions of aldehydes/ketones
8	4	Synthesis of aspirin (esterification)
9	4	Preparation of soap (saponification)
10	4	Thin-layer chromatography (TLC)
11	4	Column chromatography separation
12	4	Extraction and purification of caffeine from tea
13	4	Spectroscopic identification (IR/NMR) of compounds
14	4	Green chemistry experiment: solvent-free reaction
15	4	Final revision and lab report presentation

5. Learning and Teaching Resources

[1] Solomons, T.W. Graham, and Craig B. Fryhle. Organic Chemistry. Wiley.

[2] Loudon, Marc. Organic Chemistry. Oxford University Press.

[3] McMurry, John. Organic Chemistry. Cengage Learning.

6. Course Improvement Plan

• Update and expand course content to include modern organic synthesis and applications.

• Incorporate real-world case studies related to pharmaceuticals, polymers, and biomolecules.

• Adopt green chemistry approaches and sustainable laboratory practices.