COURSE OUTLINE TEMPLATE

	SULTAN QABOOS UNIVERSITY **COLLEGE OF SCIENCE** **BACHELOR OF SCIENCE IN CHEMISTRY** **COURSE OUTLINE**	Other logo

I. COURSE INFORMATION		
COURSE CODE	CHEM 3324	
COURSE TITLE	**ORGANIC CHEMISTRY**	
OMAN QUALIFICATION FRAMEWORK (OQF) LEVEL	**6**	
CREDIT HOURS	4	
CONTACT HOURS	3	
PRE-REQUISITES	CHEM 2101 OR CHEM 1071	
CO-REQUISITES		
EQUIVALENT COURSES		
INCOMPATIBLE COURSES		
COURSE CATEGORY	☐ University Requirement	☐ University Elective
	☐ College Requirement	☐ College Elective
	☐ Department Requirement	☐ Department Elective
	Specialization Requirement	Specialization Elective
	☐ Other (specify):	Specialization Requirement for engineering and biology
COURSE OWNER	College: Science	Department: Chemistry
	Center:	Unit:
DELIVERY MODE	X Face to Face ☐ Blended	☐ Online
COURSE TYPE	☐ Lecture	X Lecture/Lab
	☐Lecture/Seminar	☐ Lecture/Studio

	☐ Lecture/Tutorial	☐ Lecture/Lab/Tutorial or Seminar
	☐ Tutorial	☐ Laboratory (Practical)
	☐ Field or Work Placement	☐ Studio
	☐ Seminar	☐ Internship
	☐ Workshop	☐ Project
	☐ Thesis	☐ Other (specify):
LANGUAGE OF INSTRUCTION	English	
COURSE DESCRIPTION	This course is designed for Chemical & Petroleum Engineering and Biology students. It is a survey of organic chemistry functional groups; their nomenclature, structure, bonding, physical and chemical properties and discussion of structural rules that govern the formation of organic molecules, the importance of bond polarity and functional groups. The importance of stereoisomerism and molecular shape, structure of benzene and non-benzenoid heterocyclic ring systems. The course will connect petroleum, natural rubber, aspirin and other analgesics, health aspects of alcohol consumption, taste and smell, steroids, chiral drugs, structural aspects of miracle compounds, insect control, synthetic polymers, sickle cell disease and diabetes.	
TEACHING AND LEARNING STRATEGIES	☐ Augmented Reality	☐ Flipped Classroom
	☐ Blended Learning	☐Problem-Based Learning
	☐ Discovery-Based Learning	Project-Based Learning
	Student-Led Learning	☐ Team-Based Learning
	Work-Based Learning	☐ Other (specify): Traditional Classroom
ASSESSMENT COMPONENT AND WEIGHT	☐ In-term exams (s) (30%)	Quizzes (10 %)
	☐ Homework (%)	☒ Project (10%)
	☒ Final examination (50%)	☒ Practical/ Lab (5%)
		X Other (practical work assessment): (15%)
TEXTBOOKS AND EDUCATIONAL MATERIAL	Fundamentals of Organic Chemistry", John McMurry, 5th Edition, Brooks/Cole 2003	
GRADING METHOD	☒ A-F Scale	☐ Pass/Not Pass ☐ Other (specify):

GRADING METHOD DESCRIPTION			
A-F GRADING SCALE:	Range	Letter Grade	Description
	≥90	A	

	≥86	A-	**Exceptional performance:** All course objectives achieved and met in a consistently outstanding manner.
	≥81	B+	**Very Good Performance:** The majority of the course objectives achieved (majority being at least two-thirds) and met in a consistently thorough manner.
	≥77	B	
	≥73	B-	
	≥68	C+	**Satisfactory Performance:** At least most of course objectives have been achieved and met satisfactorily
	≥64	C	
	≥60	C-	
	≥55	D+	**Minimally Acceptable Performance:** The course objectives met at a minimally acceptable level.
	≥50	D	
	<50	F	**Unacceptable performance:** The course objectives not met at a minimally acceptable level.
PASS/NOT PASS:			
OTHER:			

II. SEMESTER INFORMATION			
SEMESTER/YEAR	Fall 2024	**SECTION(S)**	10 11 and 12
DAY AND TIME	Mon, Wed	**VENUE(S)**	F52
COURSE COORDINATOR	Prof. Raid Abdel-Jalil	**COURSE TEAM**	Dr. Saleh Al Busafi Prof. Younis Baqi
COORDINATOR OFFICE	SCI 2079	**OFFICE HOURS**	Sunday and Tuesday 11:00 – 12:00
COORDINATOR EXTENSION	2483	**COORDINATOR EMAIL**	jalil@squ.edu.om

III. ALIGNMENT OF COURSE LEARNING OUTCOMES (CLO), PROGRAM LEARNING OUTCOMES (PLO), GRADUATE ATTRIBUTES (GA), AND OMAN QUALIFICATION FRAMEWORK (OQF) CHARACTERISTICS

CLO	PLO	SQU GA	OQF CHARACTERISTICS (LEVEL)
1. Explain bonding properties in organic compounds and correctly represent organic structures in diffferent drawing styles	**A-1, A2**	**1** **2** **4** **5**	**1 (5)** **2 (5)** **3 (6)** **5 (6)**
2. Recognize functional groups and provide correct names for polfunctional organic compounds	**A-1, A2**	**1** **2** **5**	**1 (6)** **2 (6)** **4 (7)** **6 (5)**
3. Outline properies and characterisitics of functional groups in organic chemistry, and methods to prepare those functional groups, and describe important reactions of these functional roups	**A-1, A2, A3**	**1** **2** **3** **4**	**1 (5)** **2 (6)** **3 (6)** **4 (5)**
4. Correctly assgin stereocenters and explain the concept of stereisomerism	**A-1, A2, A3**	**1** **2** **3** **5**	**1 (7)** **2 (6)** **3 (5)** **5 (5)**
5. Mechanistically explain chemical transformations using proper formulas and reaction equations	**A-1, A2, A3**	**1** **2** **5** **6**	**1 (7)** **2 (7)** **4 (5)** **5 (5)**
6. Describe the importance of certain natural and industrial products and explain properties of compounds based on their structural characteristics	**A-1, A2, A3**	**1** **2** **4** **5**	**1 (6)** **2 (6)** **4 (5)** **6 (5)**
7. Name important industrial and pharmaceutical products and describe proper methods for the preparation of these materials	**A-1, A2**	**1** **2** **3** **4**	**1 (5)** **2 (6)** **4 (6)** **5 (6)**
8. Be a good team player to achieve common goals	**B05**	**1** **2**	**1 (6)** **2 (6)**

		4	**3 (6)** **4 (7)**
9. Be able to manage their time, meet deadlines and organize their work efficiently	**P04**	**1** **3** **5**	**1 (6)** **3 (6)** **4 (6)** **6 (7)**

IV. COURSE LEARNING OUTCOMES (CLOS) AND ASSESSMENT CRITERIA AND METHODS (FOR EACH CLO)		
CLO1: Explain bonding properties in organic compounds and correctly represent organic structures in different drawing styles		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Understanding Bonding Properties in Organic Compounds	Quiz, Weekly Report, Project
B)	Correct Representation of Organic Structures in Condensed and Expanded Formulas.	Quiz, Weekly Report, Project
C)	Ability to Draw Organic Structures Using Line-Angle (Skeletal) Notation	Quiz, Weekly Report, Project
CLO2: Recognize functional groups and provide correct names for polfunctional organic compounds		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Demonstrate the ability to accurately recognize and identify functional groups (e.g., alcohols, carboxylic acids, amines, ketones, esters, etc.) in organic molecules.	Quiz, Weekly Report, Project, Final Exam
B)	Demonstrate proficiency in applying IUPAC naming rules to polyfunctional organic compounds, ensuring that functional groups, substituents, and stereochemistry are correctly reflected in the name.	Quiz, Weekly Report, Project, Final Exam
C)	Demonstrate the ability to correctly name cyclic and aromatic compounds with functional groups, including heterocycles, benzene derivatives, and fused ring	Quiz, Weekly Report, Project, Final Exam

	systems.	
OUTLINE PROPERIES AND CHARACTERISITICS OF FUNCTIONAL GROUPS IN ORGANIC CHEMISTRY, AND METHODS TO PREPARE THOSE FUNCTIONAL GROUPS, AND DESCRIBE IMPORTANT REACTIONS OF THESE FUNCTIONAL GROUPS		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Demonstrate the ability to describe the physical and chemical properties of key functional groups (e.g., alcohols, aldehydes, ketones, carboxylic acids, amines, etc.), including factors like polarity, acidity/basicity, and reactivity.	Quiz, Weekly Report, Supervisor Assessment
B)	Identify and describe key reactions that functional groups undergo (e.g., nucleophilic addition to carbonyls, esterification of carboxylic acids, alkylation of amines).	Quiz, Weekly Report, Supervisor Assessment
C)	Compare the reactivity and properties of different functional groups, explaining how their behavior in organic reactions is influenced by factors such as electronic effects, steric hindrance, and resonance.	Quiz, Weekly Report, Supervisor Assessment
CLO4: Correctly assgin stereocenters and explain the concept of stereisomerism		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Demonstrate the ability to identify stereocenters (chiral centers) in organic molecules, recognizing atoms (typically carbon) bonded to four different groups.	Quiz, Weekly Report, Supervisor Assessment
B)	Demonstrate an understanding of the E/Z (cis/trans) system for geometric isomerism in alkenes, applying the Cahn-Ingold-Prelog rules to prioritize groups on the double bond.	Quiz, Weekly Report, Supervisor Assessment
C)	Explain the concept of dextrorotatory (+) and levorotatory (–) compounds, and how optical activity is measured in the laboratory.	Quiz, Weekly Report, Supervisor Assessment, Final Exam
CLO5: Mechanistically explain chemical transformations using proper formulas and reaction equations		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Demonstrate proficiency in using curly arrows to	Quiz, Weekly Report, Supervisor Assessment,

	accurately represent the movement of electron pairs during reaction mechanisms (e.g., nucleophilic attack, bond breaking/forming, resonance).	Final Exam
B)	Identify and describe the nature of reaction intermediates (e.g., carbocations, carbanions, radicals, etc.) that form during the course of the reaction.	Quiz, Weekly Report, Supervisor Assessment, Final Exam
C)	Explain how regioselectivity (e.g., Markovnikov's or anti-Markovnikov addition) and stereoselectivity (e.g., syn vs. anti addition) influence the outcome of chemical transformations.	Quiz, Weekly Report, Supervisor Assessment, Final Exam
CLO6: Describe the importance of certain natural and industrial products and explain properties of compounds based on their structural characteristics		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Explain the significance and uses of these products in various fields such as medicine, agriculture, food, energy, and materials science.	Quiz, Weekly Report, Supervisor Assessment, Final Exam
B)	Predict physical properties such as boiling points, melting points, solubility, and density based on molecular structure (e.g., polarity, molecular weight, intermolecular forces).	Quiz, Weekly Report, Supervisor Assessment, Final Exam
C)	xplain how the presence of functional groups (e.g., carboxyl, amine, hydroxyl) affects the reactivity, acidity/basicity, and other chemical properties of compounds.	Quiz, Weekly Report, Supervisor Assessment, Final Exam
CLO7: NAME IMPORTANT INDUSTRIAL AND PHARMACEUTICAL PRODUCTS AND DESCRIBE PROPER METHODS FOR THE PREPARATION OF THESE MATERIALS		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Demonstrate the ability to name important industrial products (e.g., plastics, fuels, detergents, polymers) and pharmaceutical compounds (e.g., antibiotics, antivirals, analgesics, anticancer agents).	Quiz, Weekly Report, Supervisor Assessment, Final Exam
B)	Demonstrate an understanding of the synthetic pathways for preparing key pharmaceutical compounds, including antibiotics (e.g., penicillin), painkillers (e.g., aspirin, ibuprofen), and anticancer drugs (e.g., paclitaxel)	Quiz, Weekly Report, Supervisor Assessment, Final Exam
C)	Demonstrate an understanding of the challenges involved in scaling up the synthesis of industrial and pharmaceutical products from laboratory to commercial	Quiz, Weekly Report, Supervisor Assessment, Final Exam

	production.	
CLO8: Be a good team player to achieve common goals		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Show willingness to take on tasks, responsibilities, and roles that support the team's overall goals.	Quiz, Weekly Report, Supervisor Assessment, Final Exam
B)	Show willingness to help and support fellow team members, providing assistance when needed and encouraging a positive team dynamic.	Quiz, Weekly Report, Supervisor Assessment, Final Exam
C)	Demonstrate effective time management within a group setting by ensuring that tasks are completed on time and deadlines are met.	Quiz, Weekly Report, Supervisor Assessment, Final Exam
CLO9: Be able to manage their time, meet deadlines and organize their work efficiently		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Demonstrate the ability to set clear, achievable goals and create a structured plan for accomplishing tasks and assignments.	Quiz, Weekly Report, Supervisor Assessment, Final Exam
B)	Show the ability to prioritize tasks based on their importance and deadlines, ensuring that critical tasks are addressed promptly.	Quiz, Weekly Report, Supervisor Assessment, Final Exam
C)	Show effective organizational skills in managing materials, resources, and digital files to streamline workflow and enhance productivity.	Quiz, Weekly Report, Supervisor Assessment, Final Exam

V. COURSE CONTENT AND SCHEDULE				
WEEK	**LECTURES #**	**TOPICS/ SUBJECTS**	**READINGS/ CHAPTERS**	**REMARKS (e.g., ASSESSMENTS)**
1 & 2			1.1 – 1.12	
3	1	Structure and Bonding; Acids and Bases	2.1 – 2.10	
4	2	The Nature of Organic Compounds: Alkanes	3.1 – 3.5	Quiz, weekly report and in-lab assessment
5	3	The Nature of Organic Reactions: Alkenes	4.1 – 4.7, 4.9, 4.13	Quiz, weekly report and in-lab assessment
6	4	Aromatic Compounds	5.1 – 5.10	Quiz, weekly report and in-lab assessment

7	5	Stereochemistry	6.1 – 6.4, 6.6 – 6.8, 6.11	Quiz, weekly report and in-lab assessment
8	6	Alkyl Halides	7.1 – 7.8	Quiz, weekly report and in-lab assessment
9	7	Alcohols, Phenols and Ethers	8.1 – 8.7	Quiz, weekly report and in-lab assessment
10	8	Aldehydes and Ketones: Nucleophilic Addition reactions	9.1 - 9.6, 9.9	Quiz, weekly report and in-lab assessment
11	9	Carboxylic Acids and Derivatives	10.1, 10.3,10.4 – 10.8, 10.11	Quiz, weekly report and in-lab assessment
12	10	Amines	12.1 – 12.6	Quiz, and in-lab assessment
13	11	Biomolecules: Carbohydrates	14.1 – 14.5, 14.6 – 14.10	in-lab assessment
14	12	Biomolecules: Carbohydrates	15.1, 15.3 – 15.9	in-lab assessment and Formal Report
15	13	Practical Final Exam	16.1 – 16.6	Report
16	14	Written Final Exam	**Final Exam**	
1 & 2			1.1 – 1.12	

VI. Additional Information (e.g., Rubrics, etc.)

VII. Students Responsibilities

It is the student's responsibility to know and comply with all University Academic Regulations relevant to participation in this course. These regulations specifically include attendance requirements and student academic code of conduct.

Academic Integrity	The University expects the students to approach their academic endeavors with the highest academic integrity. Please refer to the **Undergraduate Academic Regulations**.
Add and Drop	Students who wish to drop or add the course should review the **Undergraduate Academic Regulations**.

ATTENDANCE	Sultan Qaboos University has a clear requirement for students to attend courses, detailed in the **Undergraduate Academic Regulations**.
ASSESSMENT AND GRADING	To ensure the provision of a sound and fair assessment and grading, please review the **Undergraduate Academic Regulations**.
GRADE APPEAL	Students who wish to appeal their grades should review the **Undergraduate Academic Regulations**.
CLASSROOM POLICIES	Students are expected to dress professionally during class time as required by the University. Use of phones or any other electronic devices in the classroom during class time is strictly prohibited. Unauthorized use may lead to faculty member confiscation of the device for the remainder of the class. Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. A student responsible for disruptive behavior may be required to leave the class.
LATE AND MAKE-UP WORK	Students are required to meet the course objectives by submitting coursework no later than the assigned due date. Students may be allowed to submit late work if approved by the course coordinator. Assignments submitted after the due date may be penalized.
MISSED EVALUATIONS	All quizzes, tests, clinical evaluations, and exams must be completed by the date they are assigned. If a quiz, test, or exam is missed due to a documented emergency situation (e.g., medical emergency, death in the immediate family), it is the student's responsibility to contact the instructor. Make-up exams will not be given for assessment criteria less than 25% of the course grade, but marks will be normalized over the other assessment components for students with valid proof of emergency situation (e.g. medical sick leave)
OTHER	

Course Outline Appendix

A. PROGRAM LEARNING OUTCOMES

1. Demonstrate factual knowledge of chemistry
2. Assimilate new information into existing knowledge
3. Integrate knowledge in problem-solving, critical thinking, and analytical reasoning.

4. Appraise time requirements for assigned tasks, and manage time appropriately
5. Work within a team
6. Use modern instrumentation and techniques to conduct experiments following established procedures
7. Use and dispose of chemicals safely following appropriate procedures and regulations
8. Employ efficient use of computers for data acquisition and analysis
9. Use information sources to retrieve chemical information
10. Formulate hypothesis, design, and perform experiments
11. Communicate chemical information to specialist and non-specialist audience

B. SQU GRADUATE ATTRIBUTES

1. Cognitive Capabilities
2. Skill and Professional Capability
3. Effective Communication
4. Autonomy and Leadership
5. Responsibility and Commitment
6. Development and Innovation

C. OQF CHARACTERISTICS

1. Knowledge
2. Skills
3. Communication, Numeracy, and Information and Communication Technology Skills.
4. Autonomy and Responsibility
5. Employability and Values
6. Learning to learn