



Course Specifications

Course Title:	Special topics in Organic chemistry
Course Code:	4024583-2
Program:	Chemistry
Department:	Chemistry
College:	Applied Science
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 2hrs
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 8 th level/ 4 th year
4. Pre-requisites for this course (if any): Chemistry of Natural Products
5. Co-requisites for this course (if any): Not applicable

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	20	75%
2	Blended		
3	E-learning	4	10%
4	Distance learning		
5	Other	6	15%

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	22
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (E-learning + Exams + office hours)	10
	Total	32

B. Course Objectives and Learning Outcomes

1. Course Description The course includes some selected topics of organic chemistry which available for the student to learn and does not studied in the other pervious courses as the chemistry of biomolecules. Also, provide basic understanding of the basic principles of photochemistry and related applications.
2. Course Main Objective By the end of this course student will be familiar with the chemistry of important biomolecules such as carbohydrates, nucleic acids, amino acid, fats and oils. Also, provide basic understanding of the basic principles of photochemical reactions and their applications

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Name different organic classes and bioactive molecules such as	K2

CLOs		Aligned PLOs
	carbohydrate, nucleic acid, lipids and proteins	
1.2	Recognize the different methods of preparations of organic bioactive molecules such as carbohydrate, lipids and proteins.	K2
1.3	Familiar with the physical and chemical properties of different organic bioactive molecules such as carbohydrate, lipids and proteins	K2
1.4	outline importance of biomolecules in our environment and research developments in the field of biochemistry	K3
1.5	Define the different electronical excitation states	K1
1.6	Know the basic principles of photochemical reactions	K1
1.7	Outline the general types of photochemical reactions	K2
1.8	Write a mechanism for a photochemical transformation	K1
1.9	Recognize the application of photochemistry and its importance in our life	K3
2	Skills :	
2.1	Explain the different strategies for preparation of biomolecules	S3
2.2	Analyze the reasons for the unique physical properties in some biomolecules	S1
2.3	Summarize the different chemical pathways involved using biomolecules	S1
2.4	Discuss the different methods of preparation of bio molecules	S3
2.5	Demonstrate a synthetic pathway for synthesis of organic molecules	S3, S1
2.6	Apply the basic principles of photochemistry in organic transformations	S1
2.7	Compare between the different types of photochemical and pericyclic reactions	S1
2.8	Use computers and internet to find all information related to natural products and their applications	S5
2.9	Communicate effectively using theoretical basis of structural elucidation of the natural products to a variety of audiences	S4
3	Values:	
3.1	Write and present a chemical report related to aliphatic chemistry.	V2
3.2	work individually and in a team to perform a specific experiment or preparing a report on the aliphatic chemistry	V3
3.3	Demonstrate commitment to professional and academic values and ethics	V1

C. Course Content

No	List of Topics	Contact Hours
1	Classification and nomenclature of Carbohydrates	2
2	Chemical reactions and synthesis of carbohydrates and related compounds,	2+2E

3	Nucleosides – Nucleotides –Nucleic Acids	2
4	Amino acids: classification, nomenclature, chemical reactions and synthesis	2
5	Proteins and peptides: physical and chemical properties, and applications	2
6	Chemistry of Lipids	2
7	Chemistry and reaction of carbenes and nitrenes	2
8	Introduction to the basic principal photochemistry-Introductory concepts, The quantization of light and matter and the three principles of light matter interaction	2
9	Light nature and light sources	2
10	Light absorption and electronically excited states: Ground state (S_0), Excited states (S_1 , T_1 , T_2), and energy transfer- fluorescence - phosphorescence	1+1E
11	Theory and the excited states	1+1E
12	General types of photochemical reactions: The photochemistry of alkenes and carbonyl compounds. Photochemical cross-linking and degradation of polymers.	2
13	Applications of photochemistry in semiconductors (solar cells, storage of solar energy and its conversions).	2E
14	Selected photochemical reactions.	2E
Total		30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	Name different organic classes and bioactive molecules such as carbohydrate, nucleic acid, lipids and proteins	<ul style="list-style-type: none"> • Lectures 	<ul style="list-style-type: none"> • Exams
1.2	Recognize the different methods of preparations of organic bioactive molecules such as carbohydrate, lipids and proteins.	<ul style="list-style-type: none"> • Lectures • Web-based study 	<ul style="list-style-type: none"> • Exams • Web-based student performance systems • Portfolios
1.3	Familiar with the physical and chemical properties of different organic bioactive molecules such as carbohydrate, lipids and proteins	<ul style="list-style-type: none"> • Lectures • Scientific discussion • Library visits 	<ul style="list-style-type: none"> • Exams • Long and short essays
1.4	outline importance of biomolecules in our environment and research	<ul style="list-style-type: none"> • Lectures • Scientific discussion 	<ul style="list-style-type: none"> • Exams • HW

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	developments in the field of biochemistry	• Web-based study	
1.5	Define the different electronical excitation states	• E-learning.	• Assignments on blackboard
1.6	Know the basic principles of photochemical reactions	• Lectures	• Exams
1.7	Outline the general types of photochemical reactions	• Lectures	• Exams
1.8	Write a mechanism for a photochemical transformation	• E-learning.	• Assignments on blackboard
1.9	Recognize the application of photochemistry and its importance in our life	• Lectures • Scientific discussion • Library visits • Web-based study	• Exams • Web-based student performance systems • Portfolios
2.0	Skills		
2.1	Explain the different strategies for preparation of biomolecules	• Lectures •	• Exams
2.2	Analyze the reasons for the unique physical properties in some biomolecules	• Lectures	• Exams
2.3	Summarize the different chemical pathways involved using biomolecules	• Lectures • Scientific discussion	• Exams • Portfolios
2.4	Discuss the different methods of preparation of bio molecules	• Lectures	• Exams
2.5	Demonstrate a synthetic pathway for synthesis of organic molecules	• Lectures	• Exams
2.6	Apply the basic principles of photochemistry in organic transformations	• Scientific discussion • Web-based study	Exams
2.7	Compare between the different types of photochemical and pericyclic reactions	• Scientific discussion • Web-based study	• Exams • Web-based student performance systems • Portfolios • Posters demonstrations
2.8	Use computers and internet to find all information related to natural products and their applications	Lectures • Web based study.	• Assignments on blackboard

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.9	Communicate effectively using theoretical basis of structural elucidation of the natural products to a variety of audiences	• Scientific discussion	• Assignments on blackboard
3.0	Values		
3.1	Write and present a chemical report related to aliphatic chemistry.	Library visits	Individual and group presentations
3.2	work individually and in a team to perform a specific experiment or preparing a report on the aliphatic chemistry	Scientific discussion	Web-based student performance systems
3.3	Demonstrate commitment to professional and academic values and ethics	Scientific discussion	Individual and group presentations

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments and activities	All weeks	10%
2	E-Learning	All weeks	10%
3	Mid-term Exam	6	30%
4	Final Exam. (2 hours exam)	12	50%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- A faculty member was assigned to provide counseling and advice (about 20-25 student/ one faculty member).
- Office hours of the instructor: during the working hours weekly.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<ul style="list-style-type: none"> • T. W. Graham Solomons, Craig B. Fryhle, Scott A. Snyder "Organic Chemistry, 11th Edition, International Student Version" 2013, John Wiley & Sons. • P. Finch, <i>Carbohydrates: Structures, Syntheses and Dynamics</i>, Springer Science & Business Media, 2013. • Ian Fleming, <i>Pericyclic Reactions</i> (Oxford Chemistry Primers) 1st Edition, 1999. • Axel Griesbeck, Michael Oelgemöller, Francesco Ghetti, <i>CRC</i>
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	<i>Handbook of Organic Photochemistry and Photobiology</i> , Third Edition, 2012.
Essential References Materials	<ul style="list-style-type: none"> Lecture Handouts available on the coordinator website P. M. Collins, P. J. Ferrier, <i>Monosacharides: Their Chemistry and Their Role in Natural Products</i>, 1995, John Wiley & Sons Nicholas J. Turro, <i>Modern Molecular Photochemistry</i>, University Science Books, 1991.
Electronic Materials	<ul style="list-style-type: none"> http://www.chemweb.com http://www.sciencedirect.com http://www.rsc.org
Other Learning Materials	Course Hand outs of the PPT are available

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> Classrooms capacity (30) students. Teaching aids including computers and projector.
Technology Resources (AV, data show, Smart Board, software, etc.)	<ul style="list-style-type: none"> Room equipped with computer and projector and TV.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	<ul style="list-style-type: none"> No other requirements.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Program leader, curriculum committee; external reviewers	Direct
Extent of achievement of CLO's	Peer Reviewer	Direct
Quality of learning resources	Students, faculty members and External reviewers	Direct

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Quality committee and department counsel
Reference No.	
Date	2022

Head of Chemistry Department



Dr Moataz Morad

