هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	Chemistry of natural product
Course Code:	CEM 436
Program: :	Chemistry
Department: :	Chemistry
College:	Science
Institution: :	Majmaah University
Version:	TP- 153
Last Revision Date:	14 December 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3 hrs)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐Required		☐Elective		
3. Level/year at which this course is offered: (Level 7)					
4. Course General Description:					

The course provides fundamental knowledge to natural products chemistry, including the distribution of secondary metabolites, biosynthesis and their function in biological systems and bioactive natural products in plants and others source.

The course explain the classification, nomenclature, structure, biosynthesisand analysis besides information about their medicinal uses and structural activity relationship.

The practical part introduce fundamental aspects of extracting bioactive extract from these sources. The practical part provide the Techniques and methodologies for the extraction and separation methods of natural products from plant and demonstrate the detection methods of phytochemical Groups in Extracts.

5. Pre-requirements for this course (if any):

CEM232

6. Co-requisites for this course (if any):

There is none

7. Course Main Objective(s):

The course aims to
-Identify different types of natural products, their occurrence, structure, biosynthesis and properties.
-Demonstrate fundamental knowledge to natural products chemistry.
-Acquire skills to evaluate the properties of bioactive natural products and their structure-activity relations,
- Enable the student to achieve a fundamental knowledge of natural products chemistry, including the distribution of secondary metabolites, biosynthesis and their function in biological systems.

-knowledge about herbal substances, herbal extracts and bioactive natural products in plants, which is important in regard to the understanding of the origin, mode of action, use and production of herbal remedies and pharmaceuticals.
- Acquire skills to perform different techniques with in natural product chemistry

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distance learning	-	-

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify)**	-
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define the concepts and principles of natural products chemistry.	**K1**	-Lectures. - Conduct scientific research. -Effective Learning	- Final exam - Midterm exam - Short tests -Quizzes.
1.2	Explain Chemical Reactions of biosynthetic	**K3**		

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	pathways of natural products and structure-activity relations		- Seminars. -Discussions -Brainstorming Engagement and Motivation	- Homework - Class exercises - Evaluation of research
2.0	**Skills**			
2.1	Perform the Laboratory experiments using the right scientific methods and proper safety procedures	**S1**	-Laboratories -Effective Learning Collaborative - Learning. -Engagement and Motivation	-Practical tests -Practical reports -Performance appraisal -rubric assessment Note card Reports and Research papers
2.2	Solve chemical problems related to natural products t applications through critical thinking to develop appropriate rational, explanations, and answers	**S4**	-Lectures. - Conduct scientific research. -Laboratories -Effective Learning - Seminars. -Discussions -Brainstorming Engagement and Motivation Assignment of scientific tasks	-Final exam Practical tests - Evaluation of research - Reports Evaluation the Assignment of scientific tasks
...				
3.0	**Values, autonomy, and responsibility**			
3.1	Self-development, assess own learning and performance, and autonomously make	**V3**		Performance appraisal -Reports and

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	decisions regarding self-development and/or tasks based on convincing evidence			-Research papers

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction: Concepts of natural product chemistry. Traditional and modern approaches to the study of natural products ,chemistry of natural products and classification of the various classes of natural products.	2
2.	General methods of isolation, separation, purification, and structure determination of the natural products.	2
3.	Chemistry of of terpenes, the structure ,classification and biosynthesis of the terpenes, building blocks of Monoterpenes sesquiterpenes diterpenes and triterpenes based on the combination of a given number of isoprene units. Medicinal use of terpenes,	6
4.	Chemistry of steroids , general properties of the steroids, the structure, ,classification and biosynthesis of steroids. The importance of these compounds to humans will be mentioned.	2
5.	Biosynthesis of Natural products and bio chemical reaction of natural products	4
6.	biosynthesis of terpenes and steroids	4
7.	Chemistry of alkaloids, general properties of the alkaloids; the structure, classification and biosynthesis of alkaloids. The importance of these compounds to humans will be mentioned.	4
8.	Chemistry of flavonoids. The general definition of flavonoids, , general properties, the structure, their classifications,. The uses and benefits will be explored.	4
9.	Other natural products of current interest	2
	Total	30
	Practical part :	
1	Educating students on the fundamental aspects of extracting bioactive extract from the sources	2
2	Techniques and methodologies for the extraction and separation methods of natural products from plant	10
3	Techniques for detection of phytochemical Groups in Extracts. Phytochemical tests are carried out on all extracts using standard procedures to identify the constituents. Qualitative analysis of the crude extracts are carried out as described by literature reports	10

4	General principles, classification of chromatographic techniques, normal and reversed phase, stationary phases, activity of stationary phases, elutropic series, and separation mechanisms	6
5	Practical review	2
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework, exercises, periodic tests , Essays, laboratory reports, Presentation ,project	During the semester	10%
2.	Mid term 1	6th week	10%
3.	Mid term 2	11th week	10%
4.	Electronic exam	12th week	10%
5.	Lab exam	End of semester	20%
6.	Final exam	End of semester	40%
Total			100 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Sujata V. Bhat and B. a. Nagasampag Natural Products: Chemistry and Applications 2009
Supportive References	Cutler, Stephen J.; Cutler, Horace G.Biologically active natural products: pharmaceuticals. CRC Press.. (2000). ISBN 978-0-8493-1887-0.
Electronic Materials	https://omictools.com/universal-natural-products-database-tool http://dnp.chemnetbase.com/faces/chemical/ChemicalSearch.xhtml;jsessionid=07344CFA03634FFA92E7ABE55F6D8A74 https://www.ncbi.nlm.nih.gov/pubmed/24724941 https://iupac.org/what-we-do/databases/
Other Learning Materials	ChemDraw Professional 17.0 SuiteACD/ChemSketch :: Draw Chemical Structures :: ACD/Labs ACD/ChemSketch for Academic and Personal Usehttps://chemaxon.com/marvin

	Origin pro 8

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Class room, laboratory of Organic chemistry
Technology equipment (projector, smart board, software)	The electronic platform, data show, Smart Board
Other equipment (depending on the nature of the specialty)	Virtual laboratories Research laboratory Library

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Student evaluation (electronically questionnaire) organized by the University
Effectiveness of Students assessment	Department	Analysis of electronically questionnaire. the Make decision through department Council
Quality of learning resources	Department / staff members	Analysis of course report by Chemistry Department Council
The extent to which CLOs have been achieved	Department Faculty	CLO Analysis Report
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Chemistry Department Council	
REFERENCE NO.	17	
DATE	14/6/1446	15/12/2024