هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title:	**CHEMISTRY OF NATURAL PRODUCTS**
Course Code:	**436CHEM2**
Program:	**Bachelor in Chemistry**
Department:	**Chemistry**
College:	**College of Science**
Institution:	**Jazan University (JU)**
Version:	**T104 2022**
Last Revision Date:	**25 December 2022**

Table of Contents:

Content	Page

A. General information about the course: 3

1. Teaching mode (mark all that apply) 4

2. Contact Hours (based on the academic semester) 4

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 5

D. Students Assessment Activities 6

E. Learning Resources and Facilities 6

1. References and Learning Resources 6

2. Required Facilities and equipment 6

F. Assessment of Course Quality 7

G. Specification Approval Data 7

H. Attachments 8

1- Practical Work 8

2- Blue Print 9

A. General information about the course:

Course Identification

1. Credit hours:	3h

2. Course type

a.	University ☐	College ☐	Department☒	Track☐	Others☐
b.	Required ☒	Elective☐			

3. Level/year at which this course is offered:	Level 10 Year 4

4. Course general Description

Course Title	Course Number	Contact Hours (CH)		Credit unit (CU)	Year	Level	Pre- requisite
		Lec.	Prac.				
Chemistry of Natural Products	436CHEM2	2	1	3	4	12	232CHEM3

Course objectives: They are to identify the following.

- Main classes of natural products and their types.
- Terpenoid; importance, classification, extraction, isolation, and structure elucidation.
- Alkaloids; importance, classification, extraction, isolation, and structure elucidation.
- Natural phenolic compounds; classification, extraction, isolation, and structure elucidation.

Syllabus: A-Theoretical contents

- Definition and classification of different classes of natural products and their isolation by different chromatographic methods- Structure elucidation by means of physical and chemical methods. Some chemical reactions and biosynthesis of terpenes, steroids, alkaloids and natural phenolic (flavonoids, xanthones, anthraquinons and coumarins

Syllabus: A-Practical contents

- Preparation and identification of some organic compounds, (such as aspirin - Benzoyl Glycine – benzamide - phthalimide - picric acid - P- nitro-acetanilide, etc.)

5. Pre-requirements for this course (if any): 232CHEM3

6. Co- requirements for this course (if any): None

7. Course Main Objective(s)

This course aims to provide students with the basic knowledge about the main classes of natural products, means of extraction, isolation, structure characterization, and their most important uses

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	22	100
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	22
2.	Laboratory/Studio	22
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	Total	44

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding; (Upon completion of the course, student will be able to)			
1.1	Demonstrate a broad knowledge and understanding of the principles of natural product chemistry, concepts and terminology related to secondary metabolites including the different classes of them such as terpenes, alkaloids, phenols, steroids…. etc. (M)	K(1.1)	Lectures, directed reading, group discussion and assignments	Objective question
1.2	Know the different strategies for extraction and isolation of secondary metabolites from their sources and outline the importance and uses of these compounds. (M)	K(1.2)	Lectures, directed reading, group discussion and assignments	Objective question, Essay question
2.0	Skills: (Upon completion of the course, student will be able to)			
2.1	Demonstrate knowledge and ability to think critically to distinguish and compare between different types of	S(2.1)	Lectures, directed	Objective question, Essay

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	secondary metabolites and how to isolate and elucidate the structure of these compounds by the different methods. (P)		reading, group discussion and assignments	question, Solving Problems
2.2	Conducting experiments to isolate secondary metabolites from their sources and identify them as well as synthesis important organic compounds in lab, analyze results and write a scientific report about them. (M)	S(2.2)	Lab work, group work	Objective question, Essay question, lab report rubric
2.3	Know and follow appropriate procedures and regulations for the safe handling, use and disposal of chemicals. (P)	S(2.3)	Lab work	MCQ Safety exam
3.0	Values, autonomy, and responsibility; (Upon completion of the course, student will be able to)			
3.1	Work as a group leader in cooperation with other colleagues. (P)	V(3.1)	Group work	Practical group work Rubric

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to natural products, classification, extractions, isolation, and structure elucidation	3
2.	Terpenoid; importance, classification, extraction, isolation, and structure elucidation.	7
3.	Alkaloids; importance, classification, extraction, isolation, and structure elucidation.	4
4.	Natural phenolic compounds; classification, extraction, isolation, and structure elucidation.	5
5.	Miscellaneous natural products	3
6.	Selected experiments on preparation, isolation, and purification of simple organic compounds	22
Total		44

D. Students Assessment Activities

No	Assessment Activities *		Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Homework assignment**		**3-10**	**3%**
2.	**Quiz**		**4**	**2%**
3.	**Mid-term exam**		**7**	**15%**
4.	**Lab**	**Safety EXAM**	**5**	**4%**
		Lab reports	**2-10**	**5%**
		Final sheet exam	**11**	**6%**
		Final practical exam	**11**	**10%**
		Group work evaluation	**2-10**	**5%**
5.	**Final Exam**		**12-14**	***50 %***
	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	-كيمياء المنتجات الطبيعية – الجزء النظري, أ.د. طاهر حسن, جامعة البعث, مديرية الكتب المطبوعات الجامعية -المنتجات الطبيعية، د. حسن بن محمد الحازمي، جامعة الملك سعود-عمادة شؤون المكتبات، 1995
Supportive References	- Chemistry of Natural Products, S.V. Bhat, B.A. Nagasampagi, S. Minakshi, Springer, 2005 - Chemistry of Natural Products, Ayodhya Singh, Campus Books International, 2004 - Natural Products Isolation, S. D. Saker, Z. Latif, A. I. Gray, 2nd ed., Humana Press, Totowa, New Jersey, 2006.
Electronic Materials	https://chem.libretexts.org https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Book
Other Learning Materials	• www.wikipedia.org • https://www.slideshare.net/ShvetaArya/chemistry-of-naturalproducts

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	1 Lecture room(s) for groups of 50 students

Items	Resources
Technology equipment (Projector, smart board, software)	Smart board, Data show, Black board, internet
Other equipment (Depending on the nature of the specialty)	none

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Likert-type Survey CES) Indirect
Effectiveness of students' assessment	Instructor & Course coordinator	Classroom evaluation (direct & indirect
Quality of learning resources	Program coordinator	Indirect
The extent to which CLOs have been achieved	Assessment committee	Indirect
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	Chemistry Department Council **CHEMS2301**
REFERENCE NO.	**CHEMS230104**
DATE	**11/1/2023G – 18/06/1444H**

H. Attachments

1- Practical Work

	Experiment	Equipment, Chemicals and Tools	Week Due	Remarks
1	Lab Safety		1	The required equipment and tools for teaching the practical part are: - UV/Vis Spectrophotometer - IR spectrophotometer - NMR spectrometer - Hotplate magnetic stirrer - Condensers - Separating funnels different sizes - Rotary evaporator - Melting point apparatus - Heating mantle - TLC sheets - Capillary tubes
2	Preparation of Aspirin	Salicylic acid, acetic anhydride	2	
3	Preparation of acetanilide	Aniline acetic anhydride	3	
4	Preparation of Phthalimide	Phthalic anhydride and Urea	4	
5	Preparation of Phthalyl glycine	Phthalic anhydride and Glycine	5	
6	Preparation of benzoin	Benzaldehyde and Potassium cyanide	6	
7	Preparation of benzophenone Oxime	Benzophenone and hydroxylamine hydrochloride	7	
8	Preparation of 7-hydroxycoumarine	Resorcinol, ethyl acetoacetate, and sulphuric acid	8	
9	Extraction of caffeine from green tea	Green tea, chloroform, and separating funnel	9	
10	IR spectra of selected prepared compounds	Infra-Red Spectroscopy apparatus	10	
11	Final sheet and practical exam		11	

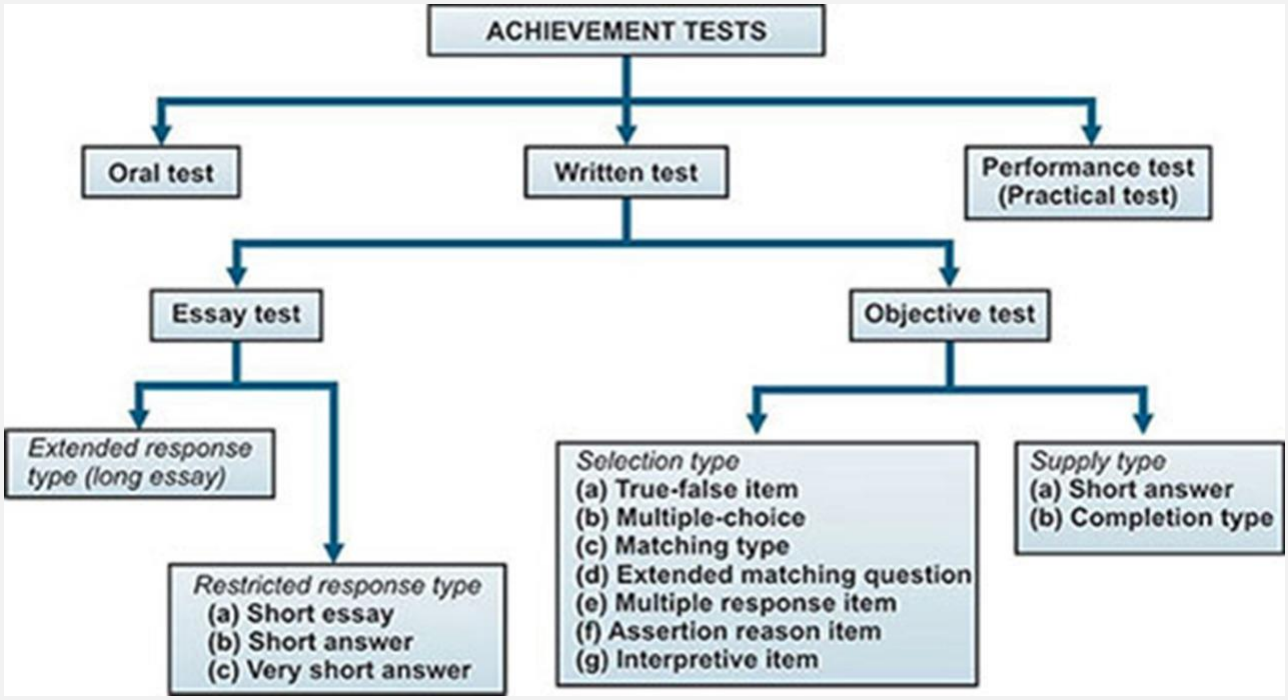
Instructors select experiments according to availability of chemicals and tools

2- Blue Print

Course Name	Chemistry of Natural Products
Course Code	436CHEM-3

PLOs	K1	K2	S1	S2	S3	S4	V1	V2
CLOs	1.1	1.2	2.1	2.2	2.3	2.4	3.1	3.2
Marks	12	20	38	21	4	--	5	---

Learning Domain	PLOs	CLOs	Assessment Type	Assessment Tool	No of Questions	Marks of the Assessment	Weight of the Assessment
Knowledge & understanding	K1	1.1 (12 M)	Quiz	Objective question	1	0.5	0.5
			Mid term		1(2)	3.5	3.5
			Final Exam		1(4)	8	8
	K2	1.2 (20 M)	Quiz	Objective question, Essay question,	1	0.5	0.5
			Mid term		1(5)	5.5	5.5
			Final Exam		1(7)	14	14
Skills	S1	2.1 (38 M)	HW	Objective question, Essay question, Solving Problems,	3(5)	3	3
			Quiz		1(2)	1	1
			Mid term		1(3)	6	6
			Final Exam		1(7)	28	28
	S2	2.2 (21 M)	Lab Report	Lab report rubric	10	5	5
			Final sheet exam	Objective question, Essay question,	3	6	6
			Final practical exam	I Task experiment	1	10	10
	S3	2.3 (4 M)	Safety Quiz	MCQ Safety exam	8	4	4
Value	V1	3.1 (5 M)	Continuous assessment	Group work evaluation rubric		5	5
TOTAL		100					100


ACHIEVEMENT TESTS
Oral test
Written test
Performance test (Practical test)
Essay test
Objective test
Extended response type (long essay)
Restricted response type
(a) Short essay
(b) Short answer
(c) Very short answer
Selection type
(a) True-false item
(b) Multiple-choice
(c) Matching type
(d) Extended matching question
(e) Multiple response item
(f) Assertion reason item
(g) Interpretive item
Supply type
(a) Short answer
(b) Completion type