



Course Specifications

Course Title:	Natural Products
Course Code:	419Chem-2
Program:	Bachelor of Science in Chemistry
Department:	Chemistry
College:	science
Institution:	King Khalid University

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A. Course Identification

1. Credit hours: 2
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: Level 8 /Year 4
4. Pre-requisites for this course (if any): 313CHEM
5. Co-requisites for this course (if any): No prerequisite

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	2	100%
2	Blended	0	0%
3	E-learning	0	0%
4	Correspondence	0	0%
5	Other	0	0%

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	30
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	0
	Total	30
Other Learning Hours*		
1	Study	10
2	Assignments	10
3	Library	10
4	Projects/Research Essays/Theses	0
5	Others(specify)	0
	Total	30

*The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

- The distinction between primary and secondary metabolites and their bioactivities roles.
- The structural characteristics of the major classes of natural product and recognize their biosynthetic building blocks, Chemical synthesis.
- Study the bioactivities of natural products as well as their roles in pharmaceutical industries.
- The chemistry underlying the methods of extraction and isolating natural products.

2. Course Main Objective

The main purpose for this course to the students can be summarized as follow:

- Know the main families of natural products.
- Know the biological significance of some of these natural products
- Know some techniques for separation and structural identification of natural products.
- Know the structural identification by chemical methods.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge:	
1.1	Describe natural products resulting from secondary metabolites, isolation and separation.	K1 and K2
1.2	Define the terpenes, Steroids, alkaloids and flavonoides: Classification, chemistry, biological importance, proving the structural by chemical means and biosynthesis.	K2 and K3
2	Skills :	
2.1	Explain the main families and the biological significance of some natural products, and develop some examples of biosynthesis.	S4
2.2	Develop some techniques for separation and structural identification of natural products.	S4
3	Competence:	
3.1	To present an oral explanation for a subject in the area.	C2, C3 and C4
3.2	To interact positively with colleagues in a group work	C2, C3 and C4
3.3	To contribute with colleagues to prepare and deliver a presentation and report of group work	C1
3.4	To conclude the literature and sources for an area in the course	C4

C. Course Content

No	List of Topics	Contact Hours
Theoretical Part:		
1	What is the Natural Product Chemistry, their Bioactivities, Primary and secondary metabolites	2
2	Terpenoids, General characterisation, extractions, their building unit, Classification, examples of each type (Mono-sesqui, di..., sester..., tri, tetra) isolation with different chromatographic techniques and structure determination by classical and modern	8

	spectroscopic tools, Biosynthesis.	
3	Steroids, The building unit, Steroids Classless: Bile acids, Cardiac steroids, sapogenins, steroidal alkaloids, the similarities and the difference with triterpenes, total synthesis.	6
4	Alkaloids, Classification, Description, Occurrence, Synthesis, various examples and their structure determination with bioactivities.	6
5	Phenolic compounds; Flavonoids, Coumrines, Chromones, Xanthones, examples of flavonoids, their structure determination.	6
5	Exams	2
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		
1.1	Describe natural products resulting from secondary metabolites, Isolation and separation.	Lectures, Interactive teaching sessions	Written exams, electronic quizzes
1.2	Define the terpenes, Steroids, alkaloids and phenolic natural products: Classification, chemistry, biological importance, proving the structural by chemical means and biosynthesis.	Tutorials, problem solving sessions	1. Written exams, electronic quizzes 2. Oral discussion and examinations
2.0	Skills		
2.1	Explain the main families and the biological significance of some natural products, and develop some examples of biosynthesis.	Lectures, problem solving sessions	Written and oral exams
2.2	Develop some techniques for separation and structural identification of natural products. Know the structural identification by chemical methods	Tutorials, problem solving sessions	Oral discussion, written examinations.
3.0	Competence		
3.1	To present an oral explanation for a subject in the area.	Open essays on selected topics	Class activities
3.2	To interact positively with colleagues in a group work	Interactive teaching sessions	Oral presentation on a group report
3.3	To contribute with colleagues to prepare	Interactive teaching sessions	Discussion within a group

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	and deliver a presentation and report of group work		
3.4	To conclude the literature and sources for an area in the course	Guided reading of books and articles	Written Reports and summaries

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework 1	4 th	3
2	Quiz -1	4 th	2
3	Mid-1	6 th	20
3	Homework 2	9 th	3
5	Quiz -2	9 th	2
6	Mid-2	10 th	20
7	Final exam	16 th	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:

Office hours (10 hours per week).

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<ol style="list-style-type: none"> 1. Natural Products from plants, 2nd, Plant Biochemistry, Vol. 13 (1993), Conn. Ed 2. Natural products by S. Mann, R.S. Davidson, J.B. Hobbs (1994). 3. Plant Biochemistry, Vol. 13 (1993), Conn. Ed
Essential References Materials	S. M. Colegate, R. J. Molyneux, Bioactive, Natural Products: Detection, Isolation, and Structure Determination, 2 nd ed., CRC Press, Taylor& Francis Group.2008.
Electronic Materials	Blackboard: E-Learning Deanship (http://elc.kku.edu.sa/). www.organic-chemistry.org/books/navi/naturalproducts.shtm
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Class and computer lab
Technology Resources (AV, data show, Smart Board, software, etc.)	Accessible databases and internet
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	-ChemDraw software

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course delivery (teaching methods and assessment methods)	Students	Questionnaire
	Departmental plan and curriculum committee; external reviewers	Reports and workshops
	Program leader	Meetings
Course contents (update)	Departmental plan and curriculum committee; external reviewers	Reports and workshops
Quality of learning resources	External reviewers	Reports

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	Department counsel
Reference No.	1/22/142
Date	15-9-1442