Course Specification
(Bachelor)

Course Title: Chromatographic Analysis	
Course Code: CHEM312-4	
Program: Bachelor of Science in Chemistry	
Department: Department of Physical Sciences	
College: College of Science	
Institution: Jazan University	
Version: TP-153 (2024)	
Last Revision Date: 31 January 2024	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4hr)

2. Course type

A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required			☐Elective	

3. Level/year at which this course is offered: (6th L/ 3rd Y)

4. Course general Description:

Course title	Course code	Contact Hours			Credit Hours	Year	Level	Prerequisite	Corequisite
		Lec	Tut	Lab					
Chromatographic Analysis	CHEM312-3	2	-	4	4	3rd	6th	CHEM311-4	-

This course aims to give the students theoretical principles and practical skills of chromatographic techniques used in the separation and analysis of a mixture of chemicals.

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

CHEM311-4

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

None

7. Course Main Objective(s):

1- Recognize the most important separation techniques used in analytical chemistry.
2- Recognize the basics, theories and terminology of chromatographic separation.
3- Recognize the most important chromatographic techniques.
4- Providing the student with the basic practical skills for using different chromatographic techniques.
5- Providing the student with the basic skills to interpret chromatographic data.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	(6x15)=90	100%
2	E-learning		
3	Hybrid		

No	Mode of Instruction	Contact Hours	Percentage
	• Traditional classroom • E-learning		
4	Traditional lab		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	$2 \times 15 = 30$
2.	**Laboratory/Studio**	$4 \times 15 = 60$
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		90

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, students are able to:			
1.1	**Demonstrate a broad understanding and critical view of the principal theories, concepts and terminology of chromatographic analysis and its applications (M)**	K1	lecture/discussion/Seminars/presentation	oral and written examinations/ laboratory reports
1.2	**Describe the main techniques and instrumentations used in chromatographic analysis and their advantages and limitations and applications (M)**	**K2**	lecture/discussion/Seminars/presentation	oral and written examinations/ laboratory reports
2.0	**Skills;** Upon completion of the course, students are able to:			
2.1	**Demonstrate an ability in critical thinking, numeracy, statistical, analytical reasoning, use of graphs and charts to solve problems in chromatographic analysis. (M)**	**S1**	lecture/discussion/Seminars/presentation	oral and written examinations/ laboratory reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Perform experiments using various chromatographic techniques; record, analyze and interpret the chromatographic data, and write reports (M)	S2	Lab work, group work	Lab report/ Lab notebook.
2.3	Apply the proper procedures and regulations for safe handling, use and disposal of chemicals. (M)	S4	Lab demonstrations / hands-on student learning activities	Safety exam
2.4	Clearly communicate the results of scientific work in the field of chromatographic techniques in oral, written and electronic formats to both scientists and the public at large.	S5	Presentation/ reports	Oral presentation /reports
3.0	**Values, autonomy, and responsibility;** Upon completion of the course, students are able to:			
3.1	**Working as a group leader in cooperation with other colleagues. (M)**	V1	lab demonstrations / whole group and small group discussions	group project reports / Practical assignments and laboratory reports

C. Course Content
<mark>1- Theoretical Part</mark>

No	List of Topics	Contact Hours
1.	Course introduction and organization	1
2.	Introduction to separation	1
3.	Introduction to chromatography	2
4.	Basic chromatographic theories, terms and equations	5
5.	Paper chromatography (PC)	1
6.	Thin-layer chromatography (TLC)	1

7.	High Performance Liquid chromatography (HPLC)	6
8.	Gas chromatography (GC)	6
9.	Analysis of real samples	4
10.	ther separation techniques	2
11.	Exam, quizzes, and discussions	1
Total		$2 \times 15 = 30$

2- Lab work

No	List of Topics	Contact Hours
1.	Lab. Experiments' organization and manual design	2
2.	Safety demonstration	2
3.	Separating food colors using paper chromatography	6
4.	Separating Amino Acids by Thin Layer Chromatography	6
5.	Separation and Identification of Pain-Killing Drugs by Thin Layer Chromatography	8
6.	Separation of dyes by Column Chromatography	8
7.	Determination of Caffeine and Benzoic Acid in Soft Drinks by HPLC with UV detector	8
8.	Qualitative Separation of Alcohols by Gas Chromatography	8
9.	Field trip to a chromatography lab	8
10.	Experiments review and discussions	4
Total		$4 \times 15 = 60$

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Periodic Exams	During Semester	15%
2.	Assignments & Classroom Activities	During Semester	5%
3.	Lab Work	During Semester	30%
4.	Final Exam	16-17	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	1. العثمان، زيد عبدالله و محمود، كريم يوسف. الكروماتوجرافيا الأسس تحضير العينات والطرق المرتبطة. دار جامعة الملك سعود للنشر، الرياض، 2021. 2. Skoog, Douglas, Donald West, F. L. Holler, and Stanley Crouch. Fundamentals of analytical chemistry. Cengage Learning, 10th Edition 2021.
Supportive References	1. سلامة، أحمد خميس محمد. التحليل الكروماتوجرافي (اساسيات وطرق التحليل). جامعة المجمعة، الطبعة الأولى، 2015.
Electronic Materials	• http://www.chromacademy.com/ • www.chromforum.org/ • http://www.lcresources.com/ • http://www.sepscience.com
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	1. Lecture Hall for 30 students equipped with modern teaching technology (projector, smart board, computer and internet) 2. Laboratory in accordance with the rules of safety and personal protection accessories should be available to all students
Technology equipment (projector, smart board, software)	- Laptop computer, smart board and internet access in the classroom and laboratory
Other equipment (depending on the nature of the specialty)	Chemicals and standards used in lab experiments - Related analytical equipment and instruments such as GC, HPLC, UV lamp for TLC, separation columns and accessories, pH meter, analytical balance, …etc

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Likert-type Survey CES) Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of Students' assessment	Instructor & Course coordinator	Class room evaluation (direct & indirect
Quality of learning resources	Program coordinator	Indirect
The extent to which CLOs have been achieved	Assessment committee	Indirect
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Physical Sciences Department Council
REFERENCE NO.	Meeting (3)
DATE	12/03/2024 -02/09/1445