هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Advanced laboratory chemistry
Course Code:	CEM 355
Program:	Chemistry (general chemistry /Industrial Track)
Department:	Chemistry
College:	College of Sciences Al Zulfi
Institution:	Majmaah university
Version:	TP-153
Last Revision Date:	14/12/2024

Table of Contents

A. General information about the course:

1. 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 6 (chemistry track)/Level 8(Industrial truck)					
4. Course general Description:					
This advanced laboratory emphasizes chemical synthesis and characterization of compounds. This course equips students with advanced laboratory techniques skills necessary for effective laboratories. practical use of modern instruments in laboratory. Emphasis is on the operational principles and application of modern instrumental methods for quantitative determination of chemical compounds. Use Spectral techniques, separation techniques, thermal analysis, electrochemical techniques, adsorption techniques, and the synthesis and characterization of nanomaterials is also featured.					
5. Pre-requirements for this course (if any)**:**					
CEM 221					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
For students undertaking this course, the aims are to: **1.knowledge about Instrumental Analysis: Nature of instrument, calibration methods, selecting methods, Electrical Components and Circuits, Signals and Noise** **2. study Components of Optical Instruments: Sources of radiation, wavelength selectors, signal processors** **3.Describe the Spectrophotometric methods.** **4.Study the applications of UV-Visible Molecular Absorption Spectrophotometry.** **5.Study Optical Atomic Spectroscopy, Atomic Absorption and Fluorescence** **6.Study Chromatographic Separations Gas, liquid Chromatography**					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	03	100%

No	Mode of Instruction	Contact Hours	Percentage
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**	7
2.	**Laboratory/Studio**	32
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		39

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**			
1.1	**Know the Beer's law and LabVIEW and training to use.**	**K.1**	**-Lectures. Discussions - Brainstorming**	**-Midterms exam - Quizzes - Homework - Final exam -Electronic exam -Class exercises**
1.2	**Recognize laboratory skills, quality control standards, and the concepts of**	**K2**	**Practical section**	**continuous assessment (rubric)**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	experimental biochemistry,			
2.0	Skills			
2.1	Demonstrate laboratory skills, proper safety procedures, and regulatory compliance in laboratory settings.	S1	Practical section	continuous assessment (rubric)
2.2	Communicate effectively orally and written using appropriate presentation methods for different biochemical issues with recipients of different types	S2	-Lecture Group discussions - Brainstorming	-Written exam -Homework -presentation
3.0	Values, autonomy, and responsibility			
3.3	Self-development, assess own learning and performance and autonomously make decisions regarding self-development and/or tasks based on convincing evidence.	V3	-Do assignment (Research-presentation-work sheet-lab report)	- Homework -Presentation (rubric) -lab report

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to LabVIEW and training to use.	1
2.	Introduction Virtual Labs and application in some experiments	1
3	Atomic Absorption Spectroscopy AAS	1
4	Gas Chromatography	1
5	High Performance Liquid Chromatography	1
6	Thin Layer chromatography (TLC)	1
7	Revision	1
	Practical part • Determination of Calcium, Iron, and Copper in Food by Atomic Absorption • Spectrophotometry in the Visible Region: Absorption Spectra, Beer's law, and the Simultaneous Analysis of a Two Component Mixture • Spectrophotometric determination of potassium permanganate solution • Resolution and Qualitative identification of Hydrocarbons by Gas Chromatography • Spectroscopic Determination of Salicylate • Paper chromatography • High Pressure Liquid Chromatography. • Gas Chromatography Revision	32
Total		39

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	1st Mid-term exam	7th	10%
2.	2nd Mid-term exam	12th	10%
3.	HomeWorks and Quizzes	Continuous	5%
4.	Presentation	One/semester	5%
5.	Electronic exam	15th	10%
6.	Final exam (Practical)	17th-19th	20%
7.	Final Theoretical exam	End of term	40%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
	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	-Principles of Instrumental Analysis, 7th ed. Skoog, Holler, and Crouch. Cengage Learning. 2017 - Chemistry Experiments for Instrumental Methods. Sawyer, Heinemen, and Beebe Wiley 1984 - LabVIEW for Everyone, Travis and Kring, Prentice Hall. 2006 , 3rd Edition
Supportive References	J. Analytical Chemistry
Electronic Materials	http://www.chemistry.ohio-state.edu
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms are available with smart boards and internet
Technology equipment (projector, smart board, software)	Computers and internet are available for online study and video tutorials.
Other equipment (depending on the nature of the specialty)	NA

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Course Evaluation Survey Quality of Exam Survey

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of Students assessment	Faculty	CLO Mapping with teaching & assessment. Course Blueprinting Grade Analysis Psychometric Analysis
Quality of learning resources	Peers	Grade Verification
The extent to which CLOs have been achieved	Faculty member / Quality assurance committee	Direct assessment outcome analysis Course report preparation
Other	Students / Faculty	Academic advising survey Student experience survey

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	CHEMISTRY DEPARTEMENT
REFERENCE NO.	MEETING 17
DATE	15-12-2024