Course Specification
(Bachelor)

Course Title:	Phase of matter and solution
Course Code:	CEM 240
Program:	Bachelor of Science in Chemistry track of Industrial Chemistry
Department:	Chemistry
College:	College of Science
Institution:	Almajmaah University
Version:	☐ New ☒ Updated*
Last Revision Date:	24/12/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2 hours)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (2nd year – 3rd level)					
4. Course General Description:					
Part A: Phases of Substances, Phase Transformation of pure substance, Gibbs Phase Rule and Phase Diagrams of one-component system, two – component system, Multi component system, Part B: Solutions. Types of solutions, colligative properties Laboratory: Experimental part is designed to complete the lecture material.					
5. Pre-requirements for this course (if any)**:**					
CEM101					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
1. **Study the phase of substance** 2. **Study the Gibbs Phase Rule.** 3. **Study the Phase Diagrams of one-component system, two – component system , Multi component system.** 4. **Study the Types of solutions,** 5. **Study the colligative properties**					

2. Teaching mode (mark all that apply)

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

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	14
2.	**Laboratory/Studio**	28
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		42

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 phase, phase rule, solvent and solute.	K1	-Lectures. -Conduct scientific research. -Seminars. -Discussions - Brainstorming	-Final exam - Midterm exam -Short tests -Quizzes. -Homework - Class exercises -Evaluation of research
1.2	Discuss the colligative Properties	K3		
2.0	**Skills**			
2.1	Apply the phase rule to determine the number of components - phases- degrees of freedom of the different systems.	S1	Lectures Laboratories Active learning - E-learning -Self-learning -Cooperative Education -Examinations	- Final exam - Midterm exam - Short tests -Quizzes. - Homework - Class exercises
2.2	Explain the graphs and the results obtained in the laboratory .	S4		

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.3	Work effectively in groups and exercise leadership when appropriate	S2		- Evaluation of research -Practical tests
3.0	**Values, autonomy, and responsibility**			
3.1	Communicate effectively in oral and written form.	V2	-Simulation programs -Cooperative work -Working in groups	-Practical tests -Practical reports -Note card -Research papers
3.2	Apply the principles of safety when dealing with various tools , chemicals and devices.	V2		

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction definitions ,phase, component, degree of freedom ,phase diagram	2
2.	Gibbs Phase Rule , the equation for the phase	1
3.	one-component system (CO_2, H_2O, Sulphur) diagrams	1
4.	two-component system diagrams	2
5.	Multi component system diagrams.	2
6.	Solutions: Types of solutions	2
7.	Exercises and solutions	2
8.	Colligative Properties :Boiling point elevation, Freezing point depression, Osmotic pressure	2
	Practical	
10.	Relationship between solubility of two limited-mixing Liquid	6
11.	Boiling point of two-component system	6
12.	Set the distribution coefficient of two limited-mixing liquids	6
13.	Application of phase rule for triple systems component	6
14.	Revision	4
Total		**42**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz	five	5%
2.	exercises	Continuous	5%
3.	First midterm exam	Six	15%
4.	Second midterm exam	Twelve	10%
5.	practical midterm exam	Eleven	5%
6.	Final practical exam.	fourteenth	20%
7.	Final Theoretical exam	Last week	40%

*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	- Physical Chemistry, Peter Atkins and etc.,Oxford University Press 11th ed. 2018 - General Chemistry: Principles and Structure James E. Brady, Wiley,2000**(Required textbook)**
Supportive References	
Electronic Materials	
Other Learning Materials	**Power point**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Prepared Classroom with Interactive whiteboard 40 chair
Technology equipment (projector, smart board, software)	Data show Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Faculty	Direct
Effectiveness of	Student	Direct

Assessment Areas/Issues	Assessor	Assessment Methods
Students assessment		
Quality of learning resources	Faculty	Direct
The extent to which CLOs have been achieved	Faculty	Direct
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Chemistry council
REFERENCE NO.	16
DATE	8/12/2024