Course Specification
(Bachelor)

Course Title:	Surface Chemistry & Catalysis
Course Code:	343CHEM -3
Program:	Bachelor of Science in Chemistry
Department:	Physical sciences
College:	College of Science
Institution:	Jazan University (JU)
Version:	TP-153 2024
Last Revision Date:	5/5/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3hrs)

2. Course type

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

3. Level/year at which this course is offered: (level 6 / Year 3)

4. Course general Description:

Course Title	*Course Number*	*Contact Hours (CH)*		*Credit unit (CU)*	*Year*	*Level*	*Pre- requisite*
		Lec.	*Prac.*				
Surface Chemistry & Catalysis	*CHEM343-3*	*3*	*0*	*3*	*3*	*6*	*241CHEM3*

Course objectives: They are to identify the following.

- ***Basic principles of surface, catalysis, colloid and adsorption processes***
- ***Parameters affecting on catalytic reactions, surface tension and colloids.***
- ***Identification of different catalytic theories, adsorption and origin of charge on colloid.***
- ***The application of surface, catalysis, colloidal and adsorption processes*.**

Syllabus: A-Theoretical contents

Adsorption and its type, factors affecting on it, Gibbs and Langmuir theory for adsorption and its application on the surface area and calculations concerning with them. Intermediate compounds and adsorption theories. Homogeneous and heterogeneous catalysis, (Enzymes), Colloids, its type, methods of preparation and its properties, theories for catalysis applications on the chemical process and heterogeneous catalyst.

Syllabus: B-Practical contents:

none

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

241CHEM3

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

none

7. Course Main Objective(s):

The course is designed to give the students' knowledge about catalytic reactions, catalyst and its different applications, and colloids also studying surface chemistry and adsorption, especially on solid surfaces.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	15 * 3 = 45	100%
2	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	---
3.	**Field**	---
4.	**Tutorial**	---
5.	**Others (specify)**	---
Total		45

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 an understanding of the concepts of surface, catalyst, colloidal and its mechanisms and applications (P)***	***K1***	***Lecture, Open discussion in class***	***MCQ Quizzes H.W***
1.2	***Describe the essential facts, principles and theories across the modeling isotherm, surface tension laws, theories of catalysis, preparation of colloids. (P)***	***K2***	***Lecture, Group work discussion***	***MCQ Labeling diagrams***
2.0	**Skills** ; (Upon completion of the course, student will be able to)			
2.1	***Demonstrate an ability in critical thinking, analytical reasoning and solving problems concerning with***	***S1***	***Lecture, Group work discussion***	***Oral, solve problems H.W.***

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	surface chemistry and adsorption (P)			
2.4	*use of communication, modern library searching and information technology about chemistry topics (I)*	*S4*	*web-based work* *Researches individual research projects, oral presentation*	*Research presentation*
3.0	**Values, autonomy, and responsibility;** (Upon completion of the course, student will be able to)			
3.1	*Act with integrity and good ethics in chemistry profession and their obligation to society* (M)	V2	*Research activities*	*Plagiarism check*

C. Course Content

No	List of Topics	Contact Hours
1.	*Meaning of surface / surface tension, parameters affect s on the surface*	*9*
2.	*Criteria for surface phenomenon and spreading of liquid, contact angle, adhesion and cohesion force*	*6*
3.	*Adsorption of gas on solid, isotherm (Freundlich, Langmuir and BET), applications*	*9*
4.	*Gibbs equation, spreading of liquids*	*4*
5.	*Catalysis theories, applications*	*6*
6.	*colloids and its applications*	*7*
7.	*Presentation Session*	*2*
8.	*General revision*	*2*
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	*HW*	*6-9*	*4*
2.	*Mid-term exams 1*	*6-8*	*15*
3.	*Mid-term exams 2*	*12-14*	*15*

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4.	***Presentation Session***	***13-14***	***4***
4.	***Ethic check***	***15***	***2***
5.	***Final Exam***	***16-17***	***60***
	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	مبادئ الكيمياء الفيزيائية المطورة الطبعة الثانية، دار المعارف القاهرة ا.د. محســن الصــباح ا.د. السيد علي حسن 1999 ***2- Handbook of Surface and Colloid Chemistry, Third Edition by K. S. Birdi 20, 2008.*** ***3- Essentials of Physical Chemistry, Arun Bahl, 26th. Ed (2018) B.S. Bahal, G.D. Yuli.***
Supportive References	***1- Physical Chemistry, James Keeler 11th .Ed.(2018) J.de Paula & P. Atkins.*** ***2- R. I. Masel, "Principles of Adsorption and Reaction on Solid Surfaces", Wiley Series in Chemical Engineering, Wiley-Inter science, New York, USA, 1996, ISBN 978-0-471-30392-3***
Electronic Materials	***Some course contents and materials are posted on Black board sites-***
Other Learning Materials	• ***www.wikipedia.org/*** • https://chem.libretexts.org/Special:Search?qid=&fpid=230&fpth=&query=surface+chemistry&type=wiki

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room(s) for groups of 40 students.
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

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.	Psci2415
DATE	28/03/1446 Corresponding to 1 / 10 /2024

H. Attachments

1- Practical Work

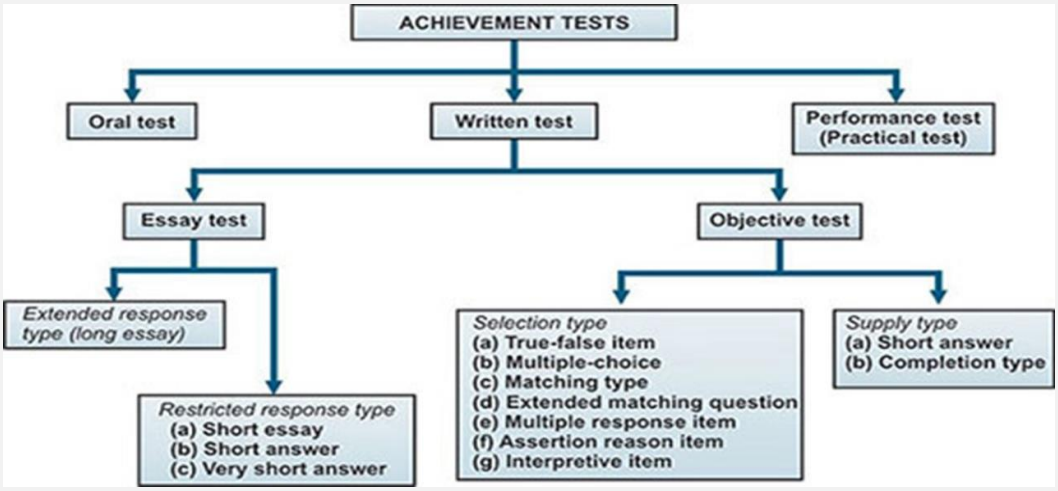
None

2- Blue Print

Course Name	**Surface Chemistry & Catalysis**
Course Code	343CHEM-3

PLOs	K1	K2	S1	S2	S3	S4	V1	V2
CLOs	1.1	1.2	2.1	--	--	2.4	--	3.2
Marks	16	26	52	--	--	4	--	2

Learning Domain	PLOs	CLOs	Assessment Type	Assessment Tool	No of Questions	Marks of the Assessment	Weight of the Assessment
Knowledge & understanding	K1	1.1 (16 M)	Mid-term	Objective test	3	4	4
			HW	Objective test	2	1	1
			Final Exam	Objective test	2	11	11
	K2	1.2 (26 M)	Mid-term	Objective test	2	10	10
			HW	Objective test	2	1	1
			Final Exam	Objective test	2	15	15
Skills	S1	2.1 (52 M)	Mid-term	Essay test , Solving Problems, comparison & chart analysis	2	16	16
			HW	Essay test, Solving Problems, comparison & chart analysis	3	2	2
			Final Exam	Essay test, Solving Problems, comparison & chart analysis	2	32	34
	S4	2.4 (6 M)	Research presentation	Research rubric			4
				PPT presentation rubric			
				Oral discussion			
Value	V2	3.2 (4 M)	Presentation ethic check	Plagiarism check rubric	-	-	2
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