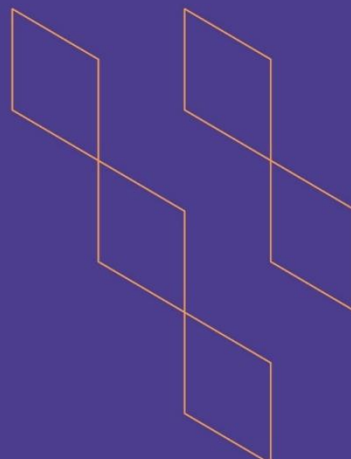




T-104  
2022

## Course Specification



Course Title: Surface Chemistry & Catalysis

Course Code: **343CHEM -3**

Program: Bachelor in Chemistry

Department: **Chemistry**

College: **College of Science**

Institution: **Jazan University (JU)**

Version: **T-104 2022**

Last Revision Date: 23 December 2022



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## A. General information about the course:

### 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 8 / 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	8	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- requirements 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.*

### 1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	33	100%
2.	E-learning		
3.	Hybrid <ul style="list-style-type: none"> <li>Traditional classroom</li> <li>E-learning</li> </ul>		
4.	Distance learning		

### 2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	33
2.	Laboratory/Studio	---
3.	Field	---
4.	Tutorial	---
5.	Others (specify)	---
	<b>Total</b>	<b>33</b>

## 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	<b>Knowledge and understanding; (Upon completion of the course, student will be able to)</b>			
1.1	<i>Demonstrate an understanding of the concepts of surface, catalyst, colloidal and its mechanisms and applications (P)</i>	K1	Lecture, Open discussion in class	MCQ Quizzes H.W.
1.2	<i>Describe the essential facts, principles and theories across the modeling isotherm, surface tension laws, theories of</i>	K2	Lecture, Group work discussion	MCQ Labeling diagrams



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	<i>catalysis, preparation of colloids. (P)</i>			
...				
2.0	<b>Skills; (Upon completion of the course, student will be able to)</b>			
2.1	<i>Demonstrate an ability in critical thinking, analytical reasoning and solving problems concerning with surface chemistry and adsorption (P)</i>	S1	<i>Lecture, Group work discussion</i>	<i>Oral, solve problems H.W.</i>
2.4	<i>use of communication, modern library searching and information technology about chemistry topics (I)</i>	S4	<i>web-based work Researches individual research projects, oral presentation</i>	<i>Research presentation</i>
...				
3.0	<b>Values, autonomy, and responsibility; (Upon completion of the course, student will be able to)</b>			
3.1				
3.2	<i>Act with integrity and good ethics in chemistry profession and their obligation to society (M)</i>	V2	<i>Research activities</i>	<i>Plagiarism check</i>
...				

## C. Course Content

No	List of Topics	Contact Hours
1.	<i>Meaning of surface / surface tension, parameters affect s on the surface</i>	6
2.	<i>Criteria for surface phenomenon and spreading of liquid, contact angle, adhesion and cohesion force</i>	2
3.	<i>Adsorption of gas on solid, isotherm (Freundlich, Langmuir and BET), applications</i>	6
4.	<i>Gibbs equation, spreading of liquids</i>	3
5.	<i>Catalysis theories, applications</i>	6
6.	<i>colloids and its applications</i>	6
7.	<i>Presentation Session</i>	2
8.	<i>General revision</i>	2
Total		33



## D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	<b>HW</b>	<b>4-8</b>	<b>5</b>
2.	<b>Mid-term exams</b>	<b>6-9</b>	<b>25</b>
3.	<b>Seminar/ Presentation Session</b>	<b>10</b>	<b>6</b>
4.	<b>Ethic check</b>	<b>10</b>	<b>4</b>
5.	<b>Final Exam</b>	<b>12-13</b>	<b>60</b>
	<b>Total</b>		<b>100</b>

\*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	<p>مبادئ الكيمياء الفيزيائية المطورة الطبعة الثانية، دار المعارف القاهرة ا.د. محسن الصباح ا.د. السيد علي حسن 1999</p> <p><b>2- Handbook of Surface and Colloid Chemistry, Third Edition by K. S. Birdi 20, 2008.</b></p> <p><b>3- Essentials of Physical Chemistry, Arun Bahl, 26<sup>th</sup>. Ed (2018) B.S. Bahal, G.D. Yuli.</b></p>
Supportive References	<p><b>1- Physical Chemistry, James Keeler 11th .Ed.(2018) J.de Paula &amp; P. Atkins.</b></p> <p><b>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</b></p>
Electronic Materials	<p><b>Some course contents and materials are posted on Black board sites-</b></p>
Other Learning Materials	<ul style="list-style-type: none"> <li>• <a href="http://www.wikipedia.org/">www.wikipedia.org/</a></li> <li>• <a href="https://chem.libretexts.org/Special:Search?qid=&amp;fpid=230&amp;fpt h=&amp;query=surface+chemistry&amp;type=wiki">https://chem.libretexts.org/Special:Search?qid=&amp;fpid=230&amp;fpt h=&amp;query=surface+chemistry&amp;type=wiki</a></li> </ul>

### 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)	<b>none</b>



## F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Likert - type Survey (CES) <u>Indirect</u>
Effectiveness of students assessment	Instructor & Course coordinator	<u>Class room evaluation (direct &amp; indirect)</u>
Quality of learning resources	Program coordinator	<u>Indirect</u>
The extent to which CLOs have been achieved	Assessment committee	<u>Indirect</u>
Other		

**Assessor** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## G. Specification Approval Data

COUNCIL /COMMITTEE	Chemistry Department Council <b>CHEMS2301</b>
REFERENCE NO.	<b>CHEMS230104</b>
DATE	<b>11/1/2023G – 18/06/1444H</b>

## H. Attachments

### 1- Practical Work

None

### 2- Blue Print

Course Name	<b>Surface Chemistry &amp; Catalysis</b>
Course Code	<b>CHEM343-3</b>

PLOs	K1	K2	S1	S2	S3	S4	V1	V2
CLOs	1.1	1.2	2.1	--	--	2.4	--	3.2
Marks	15	25	50	--	--	6	--	4

Learning Domain	PLOs	CLOs	Assessment Type	Assessment Tool	No of Questions	Marks of the Assessment	Weight of the Assessment
Knowledge & understanding	K1	1.1 (15 M)	Mid-term	Objective test	3	3	4
			HW	Objective test	2	2	1
			Final Exam	Objective test	2	10	10
	K2	1.2	Mid-term	Objective test	2	6	7





		(25 M)	HW	Objective test	2	2	1
			Final Exam	Objective test	2	17	17
Skills	S1	2.1 (50 M)	Mid-term	Essay test , Solving Problems, comparison & chart analysis	2	16	14
			HW	Essay test, Solving Problems, comparison & chart analysis	3	3	3
			Final Exam	Essay test, Solving Problems, comparison & chart analysis	2	33	33
	S4	2.4 (6 M)	Research presentation	Research rubric	-	-	2
				PPT presentation rubric			2
				Oral discussion			2
Value	V2	3.2 (4 M)	Presentation ethic check	Plagiarism check rubric	-	-	4
TOTAL		100					100

Achievement tests			
Written test			
* Essay test		* Objective test	
Extended response type	Restricted response type	Selection type	Supply type
( long essay)	a) Short essay b) Short answer c) Very short answer	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	a) Short answer b) Completion type



