Course Specifications

Course Title:	**Surface chemistry**
Course Code:	**4023554-3**
Program:	**Chemistry / Industrial Chemistry**
Department:	**Chemistry Department**
College:	**Applied Science**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: 3 (2 theoretical + 1 practical)
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: 6/3th
4. Pre-requisites for this course (if any)**: Colloids and phase rule**
5. Co-requisites for this course (if any)**: NA**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	28
2	Laboratory/Studio	42
3	Tutorial	
4	Others (specify)	
	Total	70
Other Learning Hours*		
1	Study	14
2	Assignments	4
3	Library	2
4	Projects/Research Essays/Theses	2
5	Others (specify)	
	Total	22

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

- The theoretical part includes basic information about some hot topics in surface chemistry such as surface tension its determination and nature, surfactants, adsorption from gas and solutions,…….

- The practical part contains some practical experiments related to surface tension determination using different methods and by using some equipments and adsorption from solution

2. Course Main Objective

- Enable students to get information about surface tension and its determination and study the nature of solid surface. Also, the student should know the adsorption of gas on solid surface.
- The students will have good experience in doing some experiments related to surface chemistry

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge:**	
1.1	Develop an awareness of surface tension meaning, nature, measurement and applications	**K5**
1.2	Gain knowledge of surfactants and its applications	**K3**
1.3	Develop knowledge and understanding of adsorption, applications and its measurements	**K5**
1.4	understanding the types of adsorption isotherms and its problems	**K2**
2	**Skills :**	
2.1	Understanding the principles of surface tension and its determination	**S1**
2.2	Apply the knowledge and understanding of effect of different factors on surface tension	**S2**
2.3	Understanding the importance of surfactants in our life	**S1**
2.4	evaluate, interpret the adsorption phenomena and its applications	**S4**
2.5	Problem-solving skills, relating to surface chemistry	**S7**
2.6	Basic interpersonal skills, relating to the ability to interact with other people and to engage in team working.	**S8**
2.7	Skills in experimental work related to surface chemistry	**S6**
3	**Competence:**	
3.1	Demonstrate skills in the usage of some equipments used in the Lab.	**C3**
3.2	Written and oral communication skills in class or laboratory discussions.	**C1**
3.3	Mathematical skills, in handling experimental data	**C4**

C. Course Content

No	List of Topics	Contact Hours
1	Introduction in surface tension and its determination	**2**
2	kelvin and young Laplace equations	**2**
3	Effect of temperature on surface tension and Parachor	**2**
4	Single crystal surface, simple and complex surface structures	**6**
5	Relaxed, reconstructed, faceted surfaces	**4**
6	Periodic Exam	**2**
7	Bimetallic surfaces.	**4**
8	Adsorption of gas on solid surfaces, and method of determination	**4**
9	Frindlish, Langmuir and BET adsorption isotherms	**2**
Total		

No	Practical Part: List of Topics	Contact Hours
1	Introduction to surface tension	**3**
2	Determination of the radius of the capillary tube using capillary rise method	**3**
3	Determination of the surface tension of different liquids using the capillary rise method.	**3**
4	Determination of the surface tension of water by the capillary rise method at different temperature	**3**
5	Determination of surface tension of liquids using capillary tubes of different diameters	**3**
6	Determination of the surface tension using tensiometer	**3**
7	Determination of surface tension using gyroscope	**3**
8	Determination of surface adsorption of amyl alcohol from aqueous solutions	**3**
9	Adsorption of Acetic acid on activated charcoal	**3**
10	Adsorption of oxalic acid on activated charcoal	**3**
11	Effect of concentration on adsorption	**6**
12	Effect of temperature on adsorption	**6**
Total		**42**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge**		
1.1	Develop an awareness of surface tension meaning, nature, measurement and applications	Scientific discussion and Lectures	Mid-tern and final written exams.
1.2	Gain knowledge of surfactants and its applications	Scientific discussion, library based study and Lectures	Mid-tern, oral and final written exams.
1.3	Develop knowledge and understanding of adsorption, applications and its measurements	Scientific discussion and Lectures	Mid-tern, oral and final written exams.
1.4	understanding the types of adsorption isotherms and its problems	Scientific discussion, web based study and Lectures	Mid-tern and final written exams.
2.0	**Skills**		
2.1	Understanding the principles of surface tension and its determination	Scientific discussion, library based and Lectures	Mid-tern and final written exams

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.2	Apply the knowledge and understanding of effect of different factors on surface tension	Lecture and web-based study.	Periodic tests and assignments.
2.3	Understanding the importance of surfactants in our life	Scientific discussion, library based and Lectures	Periodic tests and assignments, final exam
2.4	evaluate, interpret the adsorption phenomena and its applications	Scientific discussion, library based and Lectures	Periodic tests and assignments, final exam
2.5	Problem-solving skills, relating to surface chemistry	Lecture and web-based study.	Mid-tern and final written exams
2.6	Basic interpersonal skills, relating to the ability to interact with other people and to engage in team working.	Practical experiments in groups and web-based studies in groups. .	Evaluate the results of collective works and duties as well as knowing the contribution of each individual in labs.
2.7	Skills in experimental work related to surface chemistry	Lab. discussion and practical experiments.	Practical exams.
3.0	**Competence**		
3.1	Demonstrate skills in the usage of some equipments used in the Lab.	Lab. discussion and practical experiments	Practical exams.
3.2	Written and oral communication skills in class or laboratory discussions.	Work in groups in the Lab and in preparing some reports	Evaluate the results of collective works and duties as well as knowing the contribution of each individual in labs.
3.3	Mathematical skills, in handling experimental data	Lab discussion	Practical exams.

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework or activities.	**--**	**10 %**
2	Midterm Exam.	**8**	**20 %**
3	Practical Exams.	**14**	**30 %**
4	Final Exam. (2 hours exam)	**16**	**40 %**

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Presence of faculty members to provide consulting and advice.
- Office hours: during the working hours weekly, and the creation of appropriate means.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	1. Surface Analysis: The Principal Techniques, 2nd Edition, John C. Vickerman, Ian Gilmore, Wiley, 2009. 2. Surface Chemistry, Elaine M. Mc Cash , 1st ed., Oxford University Press, 2001. 3. Introduction to Applied Colloid and Surface Chemistry, Georgios M. Kontogeorgis & Soren Kiil, WILEY, 2016 4. Surface and Colloid Chemistry, Principles and Applications, K. S. Birdi, CRC Press, Taylor and Francis Group, 2010
Essential References Materials	
Electronic Materials	http://en.wikipedia.phys/wiki/ http://www.chemhelper.com/ http://www.chemweb.com/ http://www.sciencedirect.com
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	classroom capacity (50) students.
Technology Resources (AV, data show, Smart Board, software, etc.)	Computer connected with Data show and TV
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment.	Program Leaders	Periodic review of final exams and the student's degrees in this course.
Extent of achievement of course learning outcomes.	Peer Reviewer	Checking selected exam papers, and student assignments.
Quality of learning resources	Students	Complete the questionnaire evaluation of the course in particular

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

Received by: Dr. Ismail Althagafi **Department Head**

Signature:  **Date: 20/12/2019**