



ATTACHMENT 2 (e)

Course Specifications

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

**Course Specifications
(CS)**

Surface chemistry

4023554-3





Course Specifications

Institution: Umm Al-Qura University	Date of Report: 2017
College/Department / Applied Science /Chemistry Department	

A. Course Identification and General Information

1. Course title and code: Surface chemistry/ 4023554-3
2. Credit hours: 3 (2 theoretical + 1 practical)
3. Program(s) in which the course is offered. Chemistry and Industrial Chemistry (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course: Prof. Dr Abd El Rahman Khedr
5. Level/year at which this course is offered: 6/3th
6. Pre-requisites for this course (if any) Colloids and phase rule
7. Co-requisites for this course (if any)-----
8. Location if not on main campus: both on El-Abedyah and El-Zaher
9. Mode of Instruction (mark all that apply)
a. Traditional classroom <input checked="" type="checkbox"/> What percentage? 100 %
b. Blended (traditional and online) <input type="checkbox"/> What percentage? 70% <input type="checkbox"/>
c. e-learning <input type="checkbox"/> What percentage? <input type="checkbox"/>
d. Correspondence <input type="checkbox"/> What percentage? <input type="checkbox"/>
f. Other <input type="checkbox"/> What percentage? 30% <input type="checkbox"/>
Comments:



B Objectives

<p>1. What is the main purpose for this course?</p> <p>The objectives of this course are to 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. Also , at the end of this course the student should know the most recent surface characterization techniques</p>
<p>2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)</p> <p>The students will be mentioned to prepare an essay or a report from literature using the library, data base services, and/or websites to follow up and update the new topics of the subject of the course.</p>

C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)


1. Topics to be Covered		
List of Topics	No. of Weeks	Contact Hours
Introduction in surface tension and its determination	1	2
<ul style="list-style-type: none"> ▪ kelvin and young Laplace equations 	1	2
Effect of temperature on surface tension and Parachor	1	2
<ul style="list-style-type: none"> ▪ Single crystal surface, simple and complex surface structures and Millar indices ▪ Relaxed, reconstructed, faceted surfaces 	3	6
Periodic Exam	1	2
<ul style="list-style-type: none"> ▪ Bimetallic surfaces. ▪ Adsorption of gas on solid surfaces, and method of determination 	2	4





▪ Frindlish, Langmuir and BET adsorption isotherms	2	4
▪ Some microscopic and spectroscopic tools of surface characterization such as: SEM, TEM, AFM, STM, XRD , XPS,.....	2	4
▪ Final exam	1	2

Laboratory part:

Introduction to surface tension	
Determination of the radius of the capillary tube using capillary rise method	
Determination of the surface tension of different liquids using the capillary rise method.	
Determination of the surface tension of water by the capillary rise method at different temperature	
Determination of surface tension of liquids using capillary tubes of different diameters	
Determination of surface adsorption of amyl alcohol from aqueous solutions	
Adsorption of Acetic acid on activated charcoal (Study the Effect of concentration on adsorption)	
Adsorption of oxalic acid on activated charcoal (Study nature of adsorbate using Freundlich isotherm)	
Adsorption of Oxalic acid on activated charcoal (Application of Langmuir isotherm)	
Heat of adsorption of acetic acid on activated charcoal	

2. Course components (total contact hours and credits per semester):

	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	28		42			70
Credit	2		1			3

3. Additional private study/learning hours expected for students per week.

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	Knowledge		
1.1	Recognize the surface tension and its determination	Lectures Lab.	Exams lab manuals



1.2	Write the equations of gas adsorption on the solid	Lectures Lab	Exams lab manuals
2.0	Cognitive Skills		
2.1	Compare between techniques used in surface	Lab, Lectures	Exams
2.2	Apply the adsorption equations in the Lab.	Lab, Lectures	lab manuals
3.0	Interpersonal Skills & Responsibility		
	<ul style="list-style-type: none"> Ability to work in a team to perform a specific experimental tasks. Ability to work independently to handle chemicals Ability to communicate results of work to classmate and participation in class or laboratory discussions 	<ul style="list-style-type: none"> Class discussions Research activities 	<ul style="list-style-type: none"> Performance on in-practical exams. Work on research activity. Overall student performance in Lab. discussions Cross questions after finishing laboratory work
4.0	Communication, Information Technology, Numerical		
	<ul style="list-style-type: none"> Evaluate the different methods of surface tension determination Enhancing the ability of students to use computers and internet. Interpret chemical data Present chemical data orally. Know how to write a report. Demonstrate the methods used in adsorption . 	Lab, Lectures	Exams lab manuals
5.0	Psychomotor		
5.1	Laboratory practice . including 1.Locate Materials Safety Data Sheets, chemicals carcinogens list, and hazardous chemicals list. 2. Handle chemicals safely with a proper PPE 3.Dilute solutions, repeat analysis and calculate true result for all procedures performed as required. 4.Dispose the hazardous solution in right way	Practical session should include both demonstration and experiments .	1.Repetition of the experiments , to reproduce the results 2.Written report of chart and procedures. 3.The students should be able to correlate their results with experimental conditions
5.2			

5. Schedule of Assessment Tasks for Students During the Semester

Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
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1	Homework or activities.	--	10 %
2	Midterm Exam.	8	20 %
3	Practical Exam.	14	30 %
4	Final Exam.(2 hours exam)	16	40 %
5	Total		100 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

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

E. Learning Resources

1. List 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

2. List Essential References Materials (Journals, Reports, etc.)

3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)

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
4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.) - http://en.wikipedia.phys/wiki/Petroleum1 - http://www.chemhelper.com/ - http://www.chemweb.com/
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. - Microsoft PowerPoint, Microsoft Word - Videos on the chemistry of surfaces. - Educational CD for surface Chemistry correlated with other themes

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) - classroom capacity (30) students.
2. Computing resources (AV, data show, Smart Board, software, etc.) Hall equipped with a computer and the Data Show and Television is urgently required
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) No other requirements

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching Scheduled to complete the questionnaire calendar in particular. - Focus group discussions with small groups of students.
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor Feedback and assistance from colleagues. - Independent evaluation of the extent to which students of the standards. - independent advice to the duties and tasks
3 Processes for Improvement of Teaching Workshops for the teaching methods. - Continuous training for the faculty member. - Revision of the proposed strategies. - The provision of modern tools necessary for learning. - Application of the means of e-learning.



- Exchange of internal and external experiences

4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)

Checking the samples of test papers, or student work, which has been corrected by a faculty member.

- Exchange professors from different educational institutions on regular basis to correct samples of test papers

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

Consult with other professors teaches the same subject.

- Hosting a visiting professor to evaluate the subject.

- Workshops for teachers whom teach the same subject.

- Periodic review for teachers to modify the negatives contents in the subject.

Faculty or Teaching Staff: Prof. Dr Abd El Rahman Khedr

Signature:  **Date Report Completed: 12/1/2019** _____

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

Signature:  **Date: 20/1/2019**

