

National Commission for Academic Accreditation & Assessment

Course Specification

Institution: King Khalid University
College/Department: Chemistry

A Course Identification and General Information

1. Course title and code: Surface Chemistry, Colloid, Catalysis and Phase equilibrium (Chem 335)
2. Credit hours: 3-credit
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr/ Mohamed Hamdy Saad
5. Level/year at which this course is offered: 5/3
6. Pre-requisites for this course (if any): (232-Chem)
7. Co-requisites for this course (if any)-----
8. Location if not on main campus-----

B Objectives

<p>1. Summary of the main learning outcomes for students enrolled in the course.</p> <p>1-How the student understand the main basis of surface properties of liquids and solids 2-Investigate surface tension, work of adhesion and cohesion 3-Estimate the Kelvin and Gibbs equation 4-Compare the physical and chemical adsorption of gas on solid 5-Investigate Freundlich, Langmuir and BET equations 6-Studying the main concepts of catalysis 7-Differentiate between homogeneous and heterogeneous catalysis 8-Investigate the nature of colloidal solution 9-Studying the kinetic, electrical and optical features of colloidal solution 10-Investigate the phase diagram of water and sulphur</p>
<p>2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)</p> <p style="text-align: center;">Using Book reference and internet scientific sites</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 to definition of the surface tension of liquids and work of adhesion and cohesion	1	3
Surface tension and vapor pressure of a small droplet	1	3
Parachor property –Gibbs-equation for adsorption	1	3
Types of adsorption. Factors affecting the adsorption process	1	3
. Calculating the heat of adsorption – Liquid films on a liquid surface – Adsorption theories - Freundlich theory – Langmuir theory – BET theory	1	3
- Introduction to Catalysis Homogeneous and heterogeneous catalysis – Kinetics of enzymatic reactions.	3	9
– Colloidal state: Types – Methods of preparation, purification and properties – Dispersion and precipitation of colloids.	3	9

- Phase equilibrium – Definitions (phase - components-degrees of freedom) – Phase rule – Clausius-Clapyron equation – Phase diagram for single component systems (water and sulphur system) and for two and three component systems.	3	9
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2 Course components (total contact hours per semester):				
Lecture: 42	Tutorial: -----	Laboratory -----	Practical/Field work/Internship -----	Other:-----

3. Additional private study/learning hours expected for students per week. (This should be an average: for the semester not a specific requirement in each week)

<p>4. Development of Learning Outcomes in Domains of Learning</p> <p>For each of the domains of learning shown below indicate:</p> <ul style="list-style-type: none"> • A brief summary of the knowledge or skill the course is intended to develop • A description of the teaching strategies to be used in the course to develop that knowledge or skill • The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned
a. Knowledge
<p>(i) Description of the knowledge to be acquired</p> <p>-A student can investigate the basic postulates of surface chemistry and the nature of molecules on the surface of liquids and solids.</p> <p>-A student can investigate the nature of colloidal solution and how to apply the basic of colloidal solution in our life.</p> <p>-A student can investigate the catalytic process and how to understand the applications of catalysis in various industrial processes.</p>
<p>(ii) Teaching strategies to be used to develop that knowledge</p> <p>-Connect the scientific principles of surface chemistry, catalysis and colloids with the courses taught in the previous years.</p> <p>-Relate the main subject in the course with various industrial processes.</p>
<p>(iii) Methods of assessment of knowledge acquired</p> <p>- Oral questions and discussions during the lectures.</p> <p>- Mid-term and final examination.</p>

<ul style="list-style-type: none"> - Periodic quizzes. - Conducting some reports on the course subjects and discussing them with the students.
<p>b. Cognitive Skills</p>
<p>(i) Description of cognitive skills to be developed</p> <ul style="list-style-type: none"> -A student can understand a basic principle of surface chemistry, colloid, catalysis and phase rule. -A student can connect between the theoretical studies and the industrial applications. -A student can resolve any problems in the industrial fields in the future.
<p>(ii) Teaching strategies to be used to develop these cognitive skills</p> <ul style="list-style-type: none"> -Allow the student to solve some problems exist in the industrial fields. -Allow the student to search on some course subject from internet sites.
<p>(iii) Methods of assessment of students cognitive skills</p> <ul style="list-style-type: none"> -Oral discussions. -Seminars. -Some small projects.
<p>c. Interpersonal Skills and Responsibility</p>
<p>(i) Description of the interpersonal skills and capacity to carry responsibility to be developed</p> <ul style="list-style-type: none"> -Discuss the course subjects with the students -Allow the students to give their opinion of the course subjects. -Make some small projects with the students and every one of the student must explain his role in the project.
<p>(ii) Teaching strategies to be used to develop these skills and abilities</p> <ul style="list-style-type: none"> -Allow the students to do some experiments, some projects and write the reports with each other in groups.
<p>(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility</p> <ul style="list-style-type: none"> -Seminars -Oral discussions between students.
<p>d. Communication, Information Technology and Numerical Skills</p>
<p>(i) Description of the skills to be developed in this domain.</p> <ul style="list-style-type: none"> -Allow the student to explain some course subjects on the students and his ability in communicate with

other.
(ii) Teaching strategies to be used to develop these skills -Each student must take a chance to make a seminar.
(iii) Methods of assessment of students numerical and communication skills - The whiteboard. - The projector. - Using some tools with relation to the course.
e. Psychomotor Skills (if applicable)
(i) Description of the psychomotor skills to be developed and the level of performance required
(ii) Teaching strategies to be used to develop these skills
(iii) Methods of assessment of students psychomotor skills

5. Schedule of Assessment Tasks for Students During the Semester			
Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	First Mid-Exam	8	20%
2	Second Mid-Exam	16	20%
3	Quizz	6 and 12	10%
4	Final Exam	20	50%

D. Student Support

<p>1. Arrangements for availability of teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)</p> <p>There would be office hour to meet the students</p>

E Learning Resources

1. Required Text(s) Chemistry Department Textbook
3. Essential References -Samuel Glasstone, Textbook in Physical Chemistry 3 rd edition, 1966 -K.S.W. Sing, Sidney John Gregg, Adsorption, Adsorption, Surface area and porosity, 2 nd edition, 1991 Academic Press - E.D. Shchokin, A.V. Petrov, Colloid and surface Chemistry, 1 st Edition Elsevier, 2001.
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List) Journal of Applied Surface Chemistry Journal of Colloid and Interface Science Journal of Catalysis
4-.Electronic Materials, Web Sites etc www.sciencedirect.com
5- Other learning material such as computer-based programs/CD, professional standards/regulations -----

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Lecture rooms, laboratories, etc.) -Lecture rooms and Laboratories.
2. Computing resources Computer lab.
3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list) -----

G Course Evaluation and Improvement Processes

<p>1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching</p> <ul style="list-style-type: none">-The results of final and Mid-term exams.-Results of oral discussions.-Results of internet quizzes.
<p>2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department</p> <ul style="list-style-type: none">-Investigate the students marks <p>Follow up the level of student through several discussions.</p>
<p>3 Processes for Improvement of Teaching</p> <ul style="list-style-type: none">-Using electronic sites in the course subject.
<p>4. Processes for Verifying Standards of Student Achievement (eg. 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)</p> <ul style="list-style-type: none">-Follow up the students answer with other professors and discuss the student results through the chemistry meeting.
<p>5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.</p> <ul style="list-style-type: none">-Follow up the capability of students to understanding every point in the course subjects.