



ATTACHMENT 2 (e)

Course Specifications

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

**Course Specifications
(CS)**

Industrial Application of Catalysis

4024777-3





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: Industrial Application of Catalysis 4024777-3		
2. Credit hours: 2		
3. Program(s) in which the course is offered. Industrial chemistry (If general elective available in many programs indicate this rather than list programs)		
4. Name of faculty member responsible for the course: Dr Abd El Rahman Khedr		
5. Level/year at which this course is offered:7/4		
6. Pre-requisites for this course (if any) Surface chemistry		
7. Co-requisites for this course (if any).....		
8. Location if not on main campus: El-Abdyah		
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?	<input type="text"/>
c. e-learning	<input type="checkbox"/> What percentage?	<input type="text"/>
d. Correspondence	<input type="checkbox"/> What percentage?	<input type="text"/>
f. Other	<input type="checkbox"/> What percentage?	<input type="text"/>
Comments:		



B Objectives

<p>1. What is the main purpose for this course?</p> <p>The basic objectives of this course are to study the catalysts preparation methods and homogeneous and heterogeneous catalysis, the role of catalysts in industrial processes, and how to select the appropriate catalysts for each industrial application. Also study the most suitable process conditions of pressure and temperature at which the catalytic efficiency is maximum</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>

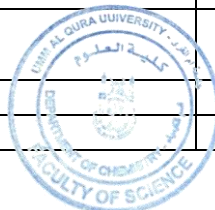
C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

1. Topics to be Covered		
List of Topics	No. of Weeks	Contact Hours
Introduction (The phenomenon catalysis, mode of action of catalysts, activity, turnover Frequency TOF, turnover number TON [T 46], selectivity, stability, classification of catalysts and comparison of homogeneous and heterogeneous catalysis).	2	4
Economic importance of catalysts. Methods of catalyst preparation	3	6
exam	1	2
Homogeneously catalyzed industrial processes (overview, production of acetic acid by carbonylation of methanol, selective ethylene oxidation by the Wacker Process, oxidation of cyclohexane, Suzuki coupling).	3	6





Heterogeneously catalyzed processes in industry (overview, production of inorganic chemicals, production of organic chemicals, refinery processes, catalyst cracking processes, ammonia synthesis, hydrogenation, methanol synthesis, selective oxidation of propene olefin polymerization, fine chemicals manufacture, acid/base catalysis)	3	6
<ul style="list-style-type: none"> Catalysis reactors. 	2	4
Final exam		



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. 4hr

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 types of catalysis	<ul style="list-style-type: none"> Lectures Scientific discussion 	Exams web-based student performance systems
1.2	Write the methods of catalyst preparation		
1.3	Define the catalyst activity, selectivity, TOF, TON....		
2.0	Cognitive Skills		
2.1	Compare between homogeneous and heterogeneous catalysis	<ul style="list-style-type: none"> Lectures Scientific discussion 	Exams web-based student performance systems
2.2	Compare different methods of catalyst preparation		
2.3	Compare between catalytic reactors		
3.0	Interpersonal Skills & Responsibility		



3.1	<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
3.2			
4.0	Communication, Information Technology, Numerical		
4.1	Calculate the reaction yields and product selectivity	Lab, Lectures	web-based student performance systems individual and group presentations
4.2	Select suitable reactor for certain reaction		
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. 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
1	Homework or activities.	--	10 %
2	Midterm Exam.	8	20 %
3	Practical Exam.	14	30 %
4	Final Exam.(2hours 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

- Catalysis Concepts and Green Applications, Gadi Rothenberg , John Wiley & Sons, **2008**.
- Industrial Catalysis: A Practical Approach, Second Edition. Jens Hagen WILEY VCH Verlag GmbH & Co. KGaA, Weinheim, **2006**, ISBN: 3-527-31144-0.
- Catalytic chemistry , Bruce C. Gates, John Wiley & Sons **1992**, New York
- Catalysis from A to Z A Concise Encyclopedia 2nd ed B. Cornils, W. A. Herrmann, R. Schlögl, C.-H. Wong, **2003**.
- Industrial Catalysis: A Practical Approach, Jens Hagen, Wiley-VCH Verlag GmbH & Co. KGaA, **2015**

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

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

- Catalysis Concepts and Green Applications, Gadi Rothenberg , John Wiley & Sons, **2008**.
- Industrial Catalysis: A Practical Approach, Second Edition. Jens Hagen WILEY VCH Verlag GmbH & Co. KGaA, Weinheim, **2006**, ISBN: 3-527-31144-0.
- Catalytic chemistry , Bruce C. Gates, John Wiley & Sons **1992**, New York
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- Industrial Catalysis: A Practical Approach, Jens Hagen, Wiley-VCH Verlag GmbH & Co. KGaA, **2015**

4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.)

<http://en.wikipedia.org/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.



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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

