

Kingdom of Saudi Arabia

**The National Commission for Academic Accreditation &
Assessment**

COURSE SPECIFICATION

Chemistry of Petroleum and Petrochemicals

4024572-3



Course Specification

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

A Course Identification and General Information

1. Course title and code: Chemistry of Petroleum and Petrochemicals, 4024572-3
2. Credit hours 3 hrs (2 hrs. Theoretical + 1 hr. Practical)
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) Chemistry Bachelor
4. Name of faculty member responsible for the course Dr. Refaat Alsayed
5. Level/year at which this course is offered : 6th / 3rd semester (1436-1437)
6. Pre-requisites for this course (if any) Heterocyclic Chemistry
7. Co-requisites for this course (if any)
8. Location if not on main campus: both on El-Abdyah and El-Zaher

B Objectives

<p>1. Summary of the main learning outcomes for students enrolled in the course.</p> <p>Study the theories of petroleum formation, petroleum classifications and quality. Study the fractional distillation of petroleum and its products, the chemical processes. Study of petrochemical industries and their importance and uses.</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>The use of smart teaching halls for lectures. Encouraging students to do reports as a self-education for natural gas and its use, Methane hydrate and alternative fuels whether using the library or the Internet.</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		
Topic	No of Weeks	Contact hours
Definition of Petroleum and its origin formation and traps	1	2
Methods of exploration and Petroleum Classification	1	2
Chemical Composition of Petroleum	1	2
Field separation of crude oil (Desalting, water treatment, gas treatment)	2	4
Refining operations and Fractional Distillation of crude oil	1	2
Crude oil Distillation products: light distillates (natural Gas, gasoline and naphtha) - Mild distillates (kerosene, heating oil and jet fuel and diesel fuel) - heavy distillates (lubricates oil and waxes, asphalt and coke oil).	2	4
Chemical conversion processes of crude oil: Cracker processes (thermal cracking and catalytic cracking and hydrocracking) - Combining processes (polymerization and alkylation) - Rearrangement processes (catalytic reforming and isomerization and improving the octane and cetane number) - Purification by hydrogen treatment (removing hydrogen sulfide compounds mercaptans and compounds of nitrogen, Etc.)	2	4

Petrochemicals definition – History of Petrochemicals industry	2	4
Production of petrochemicals and industrial uses	2	4

2 Course components (total contact hours per semester):			
Lecture: 28	Tutorial:	Practical/Fieldwork/Internship: 42	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)

Almost two hours per week spent by students to prepare reports, discuss and resolve questions, addition to the hours of theoretical lecture basic process.

4. Development of Learning Outcomes in Domains of Learning

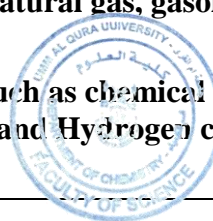
For each of the domains of learning shown below indicate:

- 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

(i) Description of the knowledge to be acquired

- **Knowledge of the various theories for oil formation and oil traps.**
- **Knowledge of oil classification and chemical composition of petroleum.**
- **Knowledge of oil pre-treatment and the field separation.**
- **Knowledge of the different ways fractional distillation of crude oil and distillate in each stage and its products (natural gas, gasoline, kerosene etc.).**
- **Knowledge of manufacturing processes such as chemical process of coking and thermal cracking, catalytic cracking and Hydrogen cracking. Thermal reforming, catalysts reforming etc.**



<ul style="list-style-type: none"> - Knowledge of the petrochemical industries initial and final. - Learn how to get the final petrochemicals such as polymers, textiles, paints, detergents, etc.
<p>(ii) Teaching strategies to be used to develop that knowledge</p> <ul style="list-style-type: none"> • Scientific discussions and work in small groups. • Use the library to do some research. • Use of the Internet to do some public reports.
<p>(iii) Methods of assessment of knowledge acquired</p> <ol style="list-style-type: none"> 1. The final written examinations and mid-semester. 2. Oral exams. 3. Discussions. 4. Systematic research on the relevant subjects.
<p>b. Cognitive Skills</p>
<p>(i) Cognitive skills to be developed</p> <ul style="list-style-type: none"> • The student acquires the skill of thinking in trying to find the best theory for oil formation because of its economic effects on the oil wealth. • The student acquires knowledge of chemical structures and predict its presence in petroleum distillates. • The student acquires the skill of petroleum distillation according to the boiling point. • Acquire the skill of the possibility of chemical conversion of chemical substance to another theoretically.
<p>(ii) Teaching strategies to be used to develop these cognitive skills</p> <ul style="list-style-type: none"> • Using brain storming at the beginning of each lecture in order to stimulate the students towards the new topic of the course. • Enhancing open discussion during the lecture.

<p>(iii) Methods of assessment of students cognitive skills</p> <p>Through assignments and homework.</p>
<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"> - Take the personality and responsibility for their own learning - Working effectively in groups and exercise leadership when appropriate - Act ethically and consistently with high molar standards in personal and public forms. - Community linked thinking
<p>(ii) Teaching strategies to be used to develop these skills and abilities</p> <ul style="list-style-type: none"> - Using the computer lab. - Visit the Central Library. - Visit research centres. - The use of international information network.
<p>(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility</p> <ul style="list-style-type: none"> - Put in the test questions explanation of the simple. Statistical information. - Evaluation of the duties associated with the proper use of communication skills and numerical mathematical skills. - The allocation of part of the grades to assess the level of use of ICT in the presentation.
<p>d. Communication, Information Technology and Numerical Skills</p>
<p>(i) Description of the skills to be developed in this domain.</p>
<p>(ii) Teaching strategies to be used to develop these skills</p>

(iii) Methods of assessment of students numerical and communication skills
e. Psychomotor Skills (if applicable)
(i) Description of the psychomotor skills to be developed and the level of performance required 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. Pipette accurately at all times 5. Titrate and weight efficiently in right way 6. Dispose the hazardous solution in right way
(ii) Teaching strategies to be used to develop these skills Practical session should include both demonstration and experiments .
(iii) Methods of assessment of students psychomotor skills 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. 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.(2 hours exam)	16	40 %
5	Total		100 %

D. Student Support

<p>1. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)</p> <ul style="list-style-type: none"> - Presence of faculty members to provide counseling and means. - Office Hours: weekly during working hours, and to create appropriate
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means

- **Academic Advising for students to those who need it.**

E Learning Resources

1. Required Text(s) Petroleum and petrochemical course presented by the lecturer.
2. Essential References <ul style="list-style-type: none">• J. G. Speight, The Chemistry and Technology of Petroleum, 5th ed. CRC Press, 2014, P. 953, ISBN: 9781439873892.• R. Curley, Fossil Fuels. Britannica, 2012, P. 160, ISBN 9781615305407.• M. A. Fahim, T. A. Alsahhaf, A. Elkilani, Fundamentals of Petroleum Refining, Elsevier, 2010, P. 496, ISBN 9780444527851.• D. S. J. Jones, Peter R. Pujadó, Handbook of petroleum processing, Springer Dordrecht Netherlands, 2006.• S. Matar, L. F. Hatch, Chemistry of Petrochemical Processes, 2nd ed. 2001, P. 392, ISBN 9780884153153.• Uttam Ray Chaudhuri. Fundamentals of Petroleum and Petrochemical Engineering. December 13, 2010 by CRC Press.• Uttam Ray Chaudhuri. Fundamentals of Petroleum and Petrochemical Engineering (Chemical Industries) Hardcover – Import, 28 Jan 2011. CRC Press; 1 edition (28 January 2011)
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List) International petroleum encyclopedia, Tulsa, Oklahoma: Pennwell, Corporation, 2007.
4-.Electronic Materials, Web Sites etc <ul style="list-style-type: none">• http://en.wikipedia.org/wiki/Petroleum1• http://www.chemhelper.com/

- <http://www.chemweb.com/>
- <http://www.sciencedirect.com/>

5- Other learning material such as computer-based programs/CD, professional standards/regulations

- **Microsoft Power Point, Microsoft Word.**
- **Video show on thermodynamics.**
- **Learning CD on thermodynamics.**

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.)

- **Classroom capacity (30) students.**
- **Processing of the classroom with appropriate educational means, including computers**

2. Computing resources

Classroom is equipped with a computer, Data Show and TV.

3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

There is no other requirement

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- **Complete the questionnaire assessment due in particular.**
- **Focus group discussions with small groups of students.**

2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department

- **Observations and the assistance of colleagues.**
- **Independent evaluation of the extent to which students of the standards.**


<ul style="list-style-type: none"> - Independent advice to the duties and tasks.
<p>3 Processes for Improvement of Teaching</p> <ul style="list-style-type: none"> - Workshops to teaching methods. - Ongoing training of faculty member. - Review the proposed strategies. - Providing modern tools necessary for learning. - Application of the means of e-learning. - The exchange of internal and external expertise
<p>4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)</p> <ul style="list-style-type: none"> - Examination of a sample of the patch test papers, or student work by an independent faculty member. - Periodic exchange and remarking of a sample of assignments or tests with a faculty member to last the same decision in other educational institution.
<p>5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.</p> <ul style="list-style-type: none"> - Consultation among professors . - Host a visiting professor to evaluate the course. - Workshops for teachers of the course. - Periodic review of the contents of the course and amend the negatives.

Faculty or Teaching Staff: Dr/ Rasha El-Mekawy

Signature: 

Date Report Completed: 12/1/2019

Received by: Dr Ismail I. Althagafi Department Head

Signature: 

Date: 20/1/2019

