

**Kingdom of Saudi Arabia**  
**The National Commission for**  
**Academic Accreditation & Assessment**



**COURSE SPECIFICATION**

**(Petroleum Chemistry, 402380-3)**

**1435 / 1436 H**

## Course Specification

Institution: <b>Umm Al-Qura University</b>
College/Department: <b>Faculty of Applied Sciences / Chemistry Department</b>

### A Course Identification and General Information

1. Course title and code: <b>Petroleum Chemistry, 402380-3</b>
2. Credit hours: <b>3 hrs. (2 theoretical + 1 practical)</b>
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs)  <b>Pure Chemistry</b>
4. Name of faculty member responsible for the course:  <b>Prof. Dr Elshafie Ahmed Mahmoud Gad</b>
5. Level/year at which this course is offered: <b>5<sup>th</sup> / third year</b>
6. Pre-requisites for this course (if any): <b>Organic Chemistry 1</b>
7. Co-requisites for this course (if any):
8. Location if not on main campus:

### B Objectives

1. Summary of the main learning outcomes for students enrolled in the course.  Study the various theories of petroleum formation and measurement of quality. Study the fractional distillation of petroleum and its products, Chemical processes. Definition of various petrochemical industries and their importance and their uses.
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)  The use of smart teaching halls for lectures. Encourage students to work in the field of reports such as natural gas and uses. Methane hydrate. Alternative fuels, whether from the library or using the Internet ,self-education

**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
<b>General scope on Petroleum (biotic and abiotic theory)</b>	1	2
<b>Chemical Composition, and evaluation of crude oil</b>	1	2
<b>Pre-treatment of crude Petroleum, desalting, emulsion breaking,</b>	1	2
<b>Petroleum refineries atmospheric and vacuum distillation of Crude oil</b>	2	4
<b>Distillation products, reaction conversions, Thermal and catalysing cracking, FCC, hydrocracking, steam cracking, coking,</b>	3	6
<b>Gasoline and octane number improvement</b>	3	6
<b>ASTM for crude petroleum and distillates</b>	3	6

2 Course components (total contact hours per semester):			
Lecture:	Tutorial:	Practical/Fieldwork/Internship:	Other:
28	_____	24	_____

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)

Saturday (8-10 AM) Saturday (10-12 AM)

#### 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.
- Knowledge of various methods of oil characterization
- Knowledge of methods of oil pre-treatment
- Knowledge of the different ways fractional distillation of crude oil and distillate in each stage

Knowledge of manufacturing processes such as chemical process of coking and thermal cracking and catalytic cracking, thermal reforming. Hydrogen cracking.

Knowledge of the petrochemical industries initial and final  
Learn how to get the final petrochemicals such as polymers, textiles, paints, detergents, etc. ....

(ii) Teaching strategies to be used to develop that knowledge

- scientific discussions and work in small groups.
- use the library to do some research.
- The use of the Internet in the work of some public reports

(iii) Methods of assessment of knowledge acquired

1. The final written examinations and mid-semester.
2. Oral exams.
3. Discussions.
4. Systematic research on the relevant subjects

##### **b. Cognitive Skills**

(i) Cognitive skills to be developed

<ul style="list-style-type: none"> <li>• 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</li> <li>• The student acquires knowledge of chemical structures and predict its presence in petroleum distillates</li> <li>• the student acquires the skill of petroleum distillation according to the boiling point</li> <li>• acquire the skill of the possibility of chemical conversion of chemical substance to another theoretically ,</li> </ul>
<p>(ii) Teaching strategies to be used to develop these cognitive skills</p> <ul style="list-style-type: none"> <li>• <b>Using brain storming at the beginning of each lecture in order to stimulate the students towards the new topic of the course.</b></li> <li>• <b>Enhancing open discussion during the lecture.</b></li> </ul>
<p>(iii) Methods of assessment of students cognitive skills</p> <p><b>Through assignments and homework</b></p>
<p><b>c. Interpersonal Skills and Responsibility</b></p>
<p>(i) Description of the interpersonal skills and capacity to carry responsibility to be developed</p> <ul style="list-style-type: none"> <li>• <b>Take the personality and responsibility for their own learning</b></li> <li>• <b>Working effectively in groups and exercise leadership when appropriate</b></li> <li>• <b>Act ethically and consistently with high molar standards in personal and public forms.</b></li> </ul> <p><b>Community linked thinking</b></p>
<p>(ii) Teaching strategies to be used to develop these skills and abilities</p> <ul style="list-style-type: none"> <li>- <b>Using the computer lab.</b></li> <li>- <b>Visit the Central Library.</b></li> <li>- <b>Visit research centers.</b></li> <li>- <b>The use of international information network.</b></li> </ul>
<p>(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility</p> <ul style="list-style-type: none"> <li>- <b>Put in the test questions explanation of the simple. statistical information.</b></li> <li>- <b>Evaluation of the duties associated with the proper use of communication skills and numerical mathematical skills.</b></li> <li>- <b>The allocation of part of the grades to assess the level of use of ICT in the presentation.</b></li> </ul>
<p><b>d. Communication, Information Technology and Numerical Skills</b></p>

(i) Description of the skills to be developed in this domain.
(ii) Teaching strategies to be used to develop these skills
(iii) Methods of assessment of students numerical and communication skills
<b>e. Psychomotor Skills (if applicable)</b>
(i) Description of the psychomotor skills to be developed and the level of performance required <b>- Not a requirement for this decision.</b>
(ii) Teaching strategies to be used to develop these skills <b>- Not a requirement for this decision.</b>
(iii) Methods of assessment of students psychomotor skills <b>- Not a requirement for this decision.</b>

<b>5. Schedule of Assessment Tasks for Students During the Semester:</b>			
<b>Assessment</b>	<b>Assessment task (eg. essay, test, group project, examination etc.)</b>	<b>Week due</b>	<b>Proportion of Final Assessment</b>
<b>1</b>	Class activities, Attendances and Duties	Throughout the Term	<b>10%</b>
<b>2</b>	Mid-Term Exam (s)	5-14	<b>20%</b>
<b>3</b>	Lab Activity and Final Exam on Lab	Throughout the Term	<b>30%</b>
<b>4</b>	Final Exam	End of the Term	<b>40%</b>
<b>5</b>	<b>Total</b>		<b>100%</b>

#### **D. Student Support**

1. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)
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- **Presence of faculty members to provide counseling and means.**
- **Office Hours: weekly during working hours, and to create appropriate means**
- **Academic Advising for students to those who need it.**

### **E Learning Resources**

1. Required Text(s) Petroleum and petrochemical course presented by the Professor
2. Essential References <b>Handbook of petroleum processing, D. S. J. Jones, Peter R. Pujadó, Springer Dordrecht Netherlands, 2006</b>
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List) <b>International petroleum encyclopedia, Tulsa, Oklahoma: Pennwell, Corporation, 2007.</b>
4- Electronic Materials, Web Sites etc <ul style="list-style-type: none"> <li>• <a href="http://en.wikipedia.org/wiki/Petroleum1">http://en.wikipedia.org/wiki/Petroleum1-</a></li> <li>• <a href="http://www.chemhelper.com/">http://www.chemhelper.com/</a></li> <li>• <a href="http://www.chemweb.com/">http://www.chemweb.com/</a></li> <li>• <a href="http://www.science.uwaterloo.ca/~cchieh/cact/">http://www.science.uwaterloo.ca/~cchieh/cact/</a></li> <li>• <a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a></li> </ul>
5- Other learning material such as computer-based programs/CD, professional standards/regulations <b>Microsoft Power Point, Microsoft Word.</b> <ul style="list-style-type: none"> <li>• <b>Video show on thermodynamics.</b></li> <li>• <b>Learning CD on thermodynamics.</b></li> </ul>

### **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.) - <b>Classroom capacity (30) students.</b> - <b>Processing of the classroom with appropriate educational means, including computers</b>
2. Computing resources  - <b>Classroom is equipped with a computer, the Data Show and TV.</b>
3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list) - <b>There is no other requirement</b>

### **G Course Evaluation and Improvement Processes**

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching  - <b>Complete the questionnaire assessment due in particular.</b> - <b>Focus group discussions with small groups of students.</b>
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department

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