



**ATTACHMENT 2 (e)**

**Course Specifications**

**Kingdom of Saudi Arabia**

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

# **Polymer Chemistry**

**4024581-3**  
**Course Specifications**  
**(CS)**





### Course Specifications

Institution: <b>Umm Al-qura University</b>	Date of Report: <b>2017</b>
College/Department : <b>Faculty of Applied Science/ department of chemistry</b>	

#### A. Course Identification and General Information

1. Course title and code: <b>Polymer Chemistry 4024581-3</b>			
2. Credit hours: <b>3 (2+1)</b>			
3. Program(s) in which the course is offered. <b>Chemistry and Industrial Chemistry</b>			
4. Name of faculty member responsible for the course: <b>Dr. Essam M. Hussein</b>			
5. Level/year at which this course is offered: <b>8<sup>st</sup> level / 4<sup>th</sup> year</b>			
6. Pre-requisites for this course (if any): <b>Petroleum chemistry and Petrochemicals</b>			
7. Co-requisites for this course (if any)---			
8. Location if not on main campus: <b>both on El-Abedyah, El-Azizya, and El-Zaher</b>			
9. Mode of Instruction (mark all that apply)			
a. Traditional classroom	<input checked="" type="checkbox"/>	What percentage? <b>100%</b>	
b. Blended (traditional and online)	<input type="checkbox"/>	What percentage?	
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?	<input type="checkbox"/>
Comments:			



## B Objectives

1. What is the main purpose for this course? <b>This course aimed to study the preparation of polymers as well as understanding their physical and mechanical properties, applications, and its economic importance.</b>
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) <b>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</b>

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
a. Introduction and definitions	1	2
b. Basic principles of polymer classification – Polymer architecture – Types of polymers	1	2
c. Molecular weight of polymers	1	2
d. Condensation polymers - addition polymer	2	4
e. Mechanisms of polymerization reactions - copolymerization	1	2
f. Physical properties of polymers	2	4
g. Thermal transitions of polymers: glass transition state Tg – factors affecting on Tg	2	4
h. Polymer uses and future applications	2	4
i. Mechanical properties of polymers	1	2
j. Industrial synthesis of polymers and technology	1	2

## Laboratory Part:

I- Synthesis of different polymeric compounds

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. 2hr

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

	<b>NQF Learning Domains And Course Learning Outcomes</b>	<b>Course Teaching Strategies</b>	<b>Course Assessment Methods</b>
<b>1.0</b>	<b>Knowledge</b>		
1.1	Identify the basic principles of polymer classification	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Scientific discussion</li> <li>• Library visits</li> <li>• Web-based study</li> </ul>	<ul style="list-style-type: none"> <li>• Exams</li> <li>• web-based student performance systems</li> <li>• portfolios</li> <li>• long and short essays</li> <li>• posters lab manuals</li> </ul>
1.2	identify different methods to determine the molecular weight of polymers		
1.3	Recognize the different methods used in the preparation of polymers		
1.4	Write the products of polymerization reaction correctly		
1.5	Recognize the different types of polymers		
1.6	Determine the type of mechanism of polymerization reactions		
1.7	Familiar with the basic knowledge about the thermal transitions of polymers		
1.8	Familiar with the basic knowledge about the importance and applications of polymers in industry		
1.9	Familiar with the mechanical properties of different polymers		
1.10			
<b>2.0</b>	<b>Cognitive Skills</b>		
2.1	Explain the physical properties of polymers	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Scientific discussion</li> <li>• Library visits</li> <li>• Web-based study</li> </ul>	<ul style="list-style-type: none"> <li>• Exams</li> <li>• web-based student performance systems</li> <li>• portfolios</li> <li>• posters</li> <li>• demonstrations</li> </ul>
2.2	Compare between the different methods of polymerization		
2.3	Explain the reaction mechanisms for different polymerization reactions		
2.4	Summarize the different methods used to synthesis of different types of polymers		
2.5	Explain the factors affecting glass transition state (T <sub>g</sub> ) of polymers		
2.6	Apply the different laboratory techniques to synthesis of polymer molecules		
2.7	Predict the future applications of polymers		
<b>3.0</b>	<b>Interpersonal Skills &amp; Responsibility</b>		



	<ul style="list-style-type: none"> <li>• Ability to work in a team to perform a specific experimental tasks.</li> <li>• Ability to work independently to handle chemicals</li> <li>• Ability to communicate results of work to classmate and participation in class or laboratory discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Class discussions</li> <li>• Research activities</li> </ul>	<ul style="list-style-type: none"> <li>• Performance on in-practical exams.</li> <li>• Work on research activity.</li> <li>• Overall student performance in Lab. discussions</li> <li>• Cross questions after finishing laboratory work</li> </ul>
<b>4.0</b>	<b>Communication, Information Technology, Numerical</b>		
	<ul style="list-style-type: none"> <li>• Evaluate the different methods to synthesis of types of polymers</li> <li>• Enhancing the ability of students to use computers and internet.</li> <li>• Interpret chemical data</li> <li>• Present chemical data orally.</li> <li>• Know how to write a report.</li> <li>• Demonstrate a synthetic pathways for synthesis of polymer molecules</li> <li>• Demonstrate the different applications of polymers in industry</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Scientific discussion</li> <li>• Library visits</li> <li>• Web-based study</li> </ul>	<ul style="list-style-type: none"> <li>• web-based student performance systems</li> <li>• individual and group presentations</li> </ul>
<b>5.0</b>	<b>Psychomotor</b>		
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.Pipette accurately at all times 5. Titrate and weight efficiently in right way 6.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	Exam	5-14	20%
2	Assignments		10%
3	Practical Exam	15	30%
4	Final Exam.(2 hours exam)	16	40%

#### 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)

- **We have faculty members to provide counseling and advice.**
- **Office hours: During the working hours weekly.**
- **Academic Advising for students.**

#### E. Learning Resources

1. List Required Textbooks

- L. H. Sperling, *Introduction to Physical Polymer Science*, 4<sup>th</sup> Edition, Wiley, **2006**.
- I. M. Ward and J. Sweeney, *An Introduction to The Mechanical Properties of Solid Polymers*, 2<sup>nd</sup> Edition, Wiley, **2004**. (TA455.P58 W36 2004).
- Stanley R. Sandler, *Polymer Synthesis*, Vol. III, Academic Press, **1980**.
- Stanley R. Sandler, *Polymer Synthesis*, Vol. I, Academic Press, **1974**.

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

- Lecture Hand outs available on the coordinator website

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

1. John McMurry's "*Organic Chemistry, 8<sup>th</sup> edition, International Edition*" **2011**, Brooks/Cole.

•

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



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

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

## 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.)

- **Classrooms capacity (30) students.**
- **Providing hall of teaching aids including computers and projector.**

2. Computing resources (AV, data show, Smart Board, software, etc.)

- **Room equipped with computer and projector and TV.**

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  
Complete the questionnaire evaluation of the course in particular.

2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor

- **Observations and the assistance of colleagues.**
- **Independent evaluation for extent to achieve students the standards.**
- **Independent advice of the duties and tasks.**

3 Processes for Improvement of Teaching

- **Workshops for teaching methods.**
- **Continuous training of member staff.**
- **Review of strategies proposed.**
- **Providing new tools for learning.**
- **The application of e-learning.**
- **Exchange of experiences internal and external.**



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)

- **Check marking of a sample of exam papers, or student work.**
- **Exchange corrected sample of assignments or exam basis with another staff member for the same course in other faculty.**

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


- **Periodic Review of the contents of the syllabus and modify the negatives.**
- **Consult other staff of the course.**
- **Hosting a visiting staff to evaluate of the course.**
- **Workshops for teachers of the course.**

Faculty or Teaching Staff: Dr. Essam M. Hussein

Signature: 

Date Report Completed: 12/1/2019

Received by: Dr Ismail I. Althagafi Department Head

Signature: 

Date: 20/1/2019

