



Course Syllabus
According to JORDAN National Qualification
Framework (JNQF)

Course Name: Polymer Chemistry

Course Number: 11014253

General Course Information:

Course title	Polymer Chemistry
Course number	11014253
Credit hours	3
Education type	Face-to-Face
Prerequisites/corequisites	11012212
Academic Program	Bachelor
Program code	01
Faculty	Science
Department	Chemistry
Level of course	Third year
Academic year /semester	2021/2022- Second Semester
Awarded qualification	Bachelor degree in chemistry
Other department(s) involved in teaching the course	-
Language of instruction	English
Date of production/revision	6/3/2022

Course Coordinator:

Coordinator's name	Dr. Samer Hasan Hussein-Al-Ali
Office No	7320
Office Phone extension number	2749
Office Hours	Sun, Tue, Thru (12-1)
Email	samer.alali@iu.edu.jo

Other Instructors:

Instructor's Name:	
Office No	
Office Phone extension number	
Office Hours	
Email	

Course Description (English/Arabic):

English	It is essential to learn synthetic methods of polymers for understanding of polymer science. This course provides an opportunity to learn general aspects of synthetic polymer chemistry as well as to study step-growth polymerizations (polycondensation, polyaddition, and addition condensation), and chain polymerizations (radical, ionic and coordination polymerizations), and polymer reaction.
Arabic	تصنيف وتسمية البوليمرات; البنية الكيميائية للبوليمر والخصائص الفيزيائية; طرق تحديد الوزن الجزيئي للبوليمرات; البوليمرات في المحاليل ولزوجة محاليل البوليمر المخففة; تفاعلات البوليمرات ذات الخطوة الواحدة; تفاعلات البلمرة المتسلسلة; البلمرة المشتركة; تكنولوجيا عمليات البلمرة..

Text Book: Author(s), Title, Publisher, Edition, Year, Book website.

1. J. M. G. Cowie, Polymers: Chemistry and Physics of Modern materials, 2nd edition Blackie 1991.
2. R. B. Seymour and C. E. Carraher, Polymer chemistry-An Introduction, 3rd edition Marcel Dekker 1992.
3. M. P. Stevens, Polymer Chemistry-An Introduction 2nd edition, Oxford Univ. Press, 1990.

References: Author(s), Title, Publisher, Edition, Year, Book website.

1. Ger Challa, Polymer Chemistry-An Introduction 3rd edition, Ellis Horwood, 1993.
2. F. W. Billmeyer, Jr., Textbook of Polymer Science, 3rd edition, John Wiley, 1984.
3. Young and Lovell, Introduction to Polymers, 2nd edition, Cambridge, Chapman & Hall, 1991.

Course Educational Objectives (CEOs):

1.	Describe how polymer morphology affects a polymer's overall properties and behaviour
2.	Teach polymer characterization techniques to determine their structure and size
3.	Detail a variety of polymerization mechanisms and their underlying kinetic/thermodynamic characteristics
4.	Introduce the practical techniques used to synthesize a wide range of polymeric structures
5.	Describe several example to calculate the molecular mass of polymers

Intended Learning Outcomes (ILO's):

1.	Subject Intended learning outcomes (ILOs) describe what students are expected to know and be able to do at the end of the course. These outcomes are related to the knowledge, skill and competence that students acquire:	Relationship to CEOs	Contribution to PLOs	Bloom Taxonomy Levels*	Descriptors**
2. A	Knowledge and Understanding:				
3. A1	Use essential descriptions about polymer chemistry (Defines related concepts, Summarizes historical evolution of the polymers. Recognizes monomers and polymers)	1	1	Knowledge	Knowledge
4. A2	Evaluate the structure of polymers. (Recognizes bounds between polymer chains, Debates thermal characters and affecting factors of thermal behaviour)	2	3	analysis	competency
5. A3	Explains intermolecular orders at polymers.	5	2	Knowledge	Knowledge
6. B	Intellectual skills:				
7. B1	Solves the problems about polymer	4	2	Knowledge	competency

	chemistry (Uses determining methods of molecular weight., Explains polymer production processes.)				
8. B2	Categorizes polymers.	2	1	Knowledge	competency
9. B3	Categorizes polymerization reactions with respect to mechanisms and distinguishes differences of these reactions.	1	4	analysis	skill

Program Learning Outcome (PLOs):

Program Learning Outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviours that students acquire as they progress through the program. A graduate of the (Chemistry) program will demonstrate					Descriptors
1.	Describe the fundamental scientific principles and theories across the four subfields of chemistry (Organic, inorganic, analytical and physical).				Knowledge
2.	Identify and confirm chemical compounds structures as well as determine chemical composition.				Knowledge
3.	Establish and concludes mechanisms of physical and chemical processes in addition to the ability of mastering qualitative and quantitative determination.				competency
4.	Solve the scientific problems using different mechanisms and procedures based on critical thinking.				skill
5.	Conduct scientific experiments in chemistry.				competency
6.	Commitment and interest in lifelong learning, and collaborate effectively with other people in a team.				competency
7.	Prepare logical, organized and concise written reports, and oral and poster presentations that effectively communicate chemical content to other scientists.				skill
8.	Commitment to the ethical principles of chemical research.				competency
9.	Find information about chemistry through databases and information				skill
10.	Evaluation of calculations in chemistry experiments and information analysis using computer software.				competency
11.	Demonstrate safety laboratory techniques.				skill

* Descriptors according to the national qualifications framework (knowledge, skill, Competency)

Weekly Schedule (please choose the type of teaching)

✓ Face to Face

□ Hybrid (2 Lectures Face – To - Face +1 Lecture Asynchronous)

□ Hybrid (1 Lectures Face – To - Face +1 Lecture Asynchronous)

□ Online (2 Lectures Synchronous +1 lecture Asynchronous)

Week	First Lecture (Face – To - Face)	Second Lecture (Face – To - Face)	Third Lecture (Face – To - Face)	Ach. ILOs	Ach. PLOs	Descriptors**
1	Basic Principles Definitions, classification of polymers,	nomenclature	polymerization reactions	A1	2	Knowledge
2	nomenclature	nomenclature	nomenclature	B2	1	skill

3	nomenclature	nomenclature	nomenclature	A1	3	competency
4	Polymer Structure and Polymer Morphology	Polymer morphology, interchain interactions, glass transition,	temperature, stereochemistry, polymer crystals,	A1	3	competency
5	amorphous state, chemical and physical crosslinking.	amorphous state, chemical and physical crosslinking.	amorphous state, chemical and physical crosslinking.	B3	3	competency
6	Polymer Characterization - Molar Masses Definition of molar mass averages, polymer solutions,	the measurement of absolute molar masses, secondary methods of molar mass determinations, molar mass distribution	the measurement of absolute molar masses, secondary methods of molar mass determinations, molar mass distribution	A2	3	competency
7	the measurement of absolute molar masses, secondary methods of molar mass determinations, molar mass distribution	the measurement of absolute molar masses, secondary methods of molar mass determinations, molar mass distribution	the measurement of absolute molar masses, secondary methods of molar mass determinations, molar mass distribution	B1	2	Knowledge
8	Step Reaction Polymerization	Step Reaction Polymerization	Step Reaction Polymerization	A3	2	Knowledge
9	Step Reaction Polymerization	Step Reaction Polymerization	Step Reaction Polymerization	A3	2	Knowledge
10	الاختبار النصفى					
11	Chain Reaction Polymerization	Chain Reaction Polymerization	Chain Reaction Polymerization	B2	3	competency
12	Chain Reaction Polymerization	Chain Reaction Polymerization	Chain Reaction Polymerization	B2	3	competency
13	Ionic and Coordination Polymerization	Ionic and Coordination Polymerization	Ionic and Coordination Polymerization	B2	3	competency
14	Ionic and Coordination Polymerization	Ionic and Coordination Polymerization	Ionic and Coordination Polymerization	B2	3	competency
15	Ionic and Coordination Polymerization	Ionic and Coordination Polymerization	Ionic and Coordination Polymerization	B2	2	Knowledge
16	الاختبار النهائي					
17						

* K: Knowledge, S: Skills, C: Competency

Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

- Interactive videos
- Practice Labs
- Discussion Forums
- Quizzes
- Other Interactive online activities
- Reports

Course Policies:

A- Attendance policies:

The maximum allowed absences is 15% of the lectures.

B- Absences from exams and handing in assignments on time:

Midterm exam can be retaken based on approval of excuse by the instructor's discretion.

Not handing assignment on time will incur penalties.

C- Academic Health and safety procedures

D- Honesty policy regarding cheating, plagiarism, and misbehaviour:

Cheating, plagiarism, misbehaviour will result in zero grade and further disciplinary actions may be taken.

E- Grading policy:

- All homework is to be posted online through the e-learning system.
- Exams will be marked within 72 hours and the marked exam papers will be handed to the students.
- Online Activities (Course Videos, Practice labs, Discussion Forums, Quizzes) **20%**
- Midterm **30%**
- Final Exam **50%**

F- Available university services that support achievement in the course: **E-Learning Platform, Labs, Library.**


Required equipment:

- **PC / Laptop with webcam and mic**
- **Internet Connection**
- **Access to the IU E-Learning Platform at: <https://elearn.iu.edu.jo/>**
- **E-learning plan**
- Satisfaction questionnaires for online and face-to-face learning
- Software for e-learning
- Training

Assessment Tools implemented in the course:

- Final Exam
- Midterm Exam
- Quizzes
- Homework
- Improvement plans for online or face-to-face teaching

Responsible Persons and their Signatures:

Course Coordinator	Dr. Samer Al-Ali	Completed Date	6/3/2022
		Signature	
Received by (Department Head)	Dr. Manal khabbas	Received Date	6/3/2022
		Signature	