The University of Jordan
School of Engineering
Chemical Engineering Department

Program: B.Sc.
Academic Year: (/)
Semester: Semester

- **CHE 0905431: Polymers Engineering**

- **Course Catalog (2024)**

Raw materials. Types of polymers. Role of polymer and plastics industries. Polymer reaction engineering. Polymer properties. Analysis of polymer processing in terms of elementary steps and shaping methods. Transport phenomena. Polymer melts rheology. Extrusion. Injection molding. Blowmolding. Film blowing. Calendering.

Credit hours	**3**	**Level**		**Pre-requisite(s)**	**0905421** **0915331**
Instructor **Dr. Motasem Saidan**		**Office number** **CHE303**		**Office phone** Ext. 22893	
Course website https://elearning.ju.edu.jo/login/index.php		**E-mail** **m.saidan@ju.edu.jo**		**Place** Refer to Registration website	

- **Textbook:**
  1. Robert O. Ebewele**. Polymer Science and Technology.** CRC Press, New York, 2000
  2. Instructor Handouts.

- **References:**
  1. Anil Kumar and Rakesh K. **Fundamentals of Polymers** Engineering, 2nd edit. McGraw-Hill, 2003.

- **Learning Objectives and Intended Learning Outcomes**

Objectives	Outcomes
1. Acquiring basic introduction to polymers and plastics, classifications, and polymer chemistry	1.1 Demonstrate ability to **Define** the basic vocabulary of polymer science. **Recognize** the different structure of polymeric materials. **Distinguish** between thermoplastics, elastomers and thermosets Polymers. **Explain** the difference between homo and copolymers from engineering point of view. **O3**
2. Fundamental understanding of molar mass and degree of polymerization	2.1 Demonstrate ability to **Apply** the Molar mass distribution, and **Calculate** Molar mass averages. **O1, O6**
3. Apply full characterization of polymeric materials and data analysis	3.1 Demonstrate ability to conduct chemical, thermal and mechanical testing and characterization of polymeric sample, and the affecting parameters. **O1, O6**
3. Basic and Fundamental understanding of polymerization reactions and mechanisms	3.1 Demonstrate ability to understand the method of free radical polymerization, polymerization processes **O3, O7**
4. Enhance the ability of students for life-long learning and communication skills	4.1 Enhance students' skills through intensive use of available data resources and short projects with written and oral presentations **O3, O4**

▪ Topics Covered

Week	Topics	Reference
1	Course Introduction and Overview: ▪ Polymer chemistry ▪ Polymer shape: Configuration & Conformation ▪ Classification of polymers ▪ Structure ▪ Thermoplastics ▪ Elastomers ▪ Thermosets ▪ Homopolymers ▪ Copolymer	Handouts, Textbook
2	Polymer classification Polymer crystallinity and affecting parameters.	Handouts, Textbook
3-4	Molecular weight distribution • Molar mass distribution • Molar mass averages • Viscosity-Molecular Weight Relations • Measurement tools	Handouts, Textbook
5-6	Classification of polymerization reactions • Condensation polymerization • Addition polymerization • Step polymerization • Linear step polymerization • Polycondensation • Polyaddition	Handouts, Textbook
7-8	Method of free radical polymerization • Bulk polymerization • Solution polymerization • Suspension polymerization • Emulsion polymerization	Handouts, Textbook
9	Thermal Analysis	Handouts, Textbook
10	Mechanical Analysis	Handouts, Textbook
11-12	Polymer Processing: Extrusion	Handouts, Textbook
13-14	Polymer Processing: Injection Molding	Handouts, Textbook
15-16	Polymer Processing: Blow Molding, Film Blowing, Calendaring.	Handouts, Textbook

▪ Evaluation

Evaluation Tool	Weight	Date
Midterm Exam	30	Will be announced by the department
Semester Activities (Quizzes, Reports, etc)	30	will be announced by instructor
Final Exam	40	Will be announced by the University

▪ Intended Scale

F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A

▪ Relationship to Program Outcomes (%)

O1	O3	O4	O6	O7						

▪ Relationship to CHE Program Objectives

PEO1	PEO2	PEO3	PEO4
√	√	√	√

▪ Document Control

Prepared by	Dr. Motasem Saidan
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