Course Specification
— (Bachelor)

Course Title: **Chemistry of Polymer**

Course Code: **446CHEM-2**

Program: **Bachelor of Science in Chemistry**

Department: **Physical Sciences**

College: **College of Science**

Institution: **Jazan University (JU)**

Version: **TP-153 2024**

Last Revision Date: 5/5/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2h)

2. Course type

A.	□University	□College	☒ Department	□Track	□Others
B.	☒ Required			□Elective	

3. Level/year at which this course is offered: (Level 7/ Year 4)

4. Course general Description:

Course Title	Course Number	Contact Hours (CH)		Credit unit (CU)	Year	Level	Pre-requisite
		Lec.	Prac.				
Chemistry of polymer	*446CHEM2*	*2*	*0*	*2*	*4*	*7*	*342CHEM3*

This course aims to give students the basic principles of photochemistry and its chemical and biological applications

Course objectives: They are to identify the following.

1. *Nomenclature, classification and synthesis of polymers*
2. *Mechanisms and kinetics of polymer reactions*
3. *structural morphology and composition of polymeric materials (Crystallinity and Amorphous polymers)*
4. *Physical properties (Thermal, mechanical and molecular weight distribution) of polymeric materials*
5. *The applications of polymeric materials (packaging-Medical)*

Syllabus: A-Theoretical contents

The course is divided into 4 sections: Polymer solution behaviors - Physical and structural morphology of polymers - Mechanical and thermal properties of polymers

Syllabus: A-Practical contents
none

5. Pre-requirements for this course (if any):

342CHEM-3

6. Co-requisites for this course (if any):

None

7. Course Main Objective(s):

This course aims to give students the fundamental principles of polymer chemistry, mechanism, kinetics, morphological structure and its chemical industrial applications.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**; (Upon completion of the course, student will be able to)			
1.1	Demonstrate a broad knowledge and understanding in polymer chemistry topics as, polymer monomer, polymerization, tacticity, crystalline and amorphous polymers, stress and strain , …. etc *(M)*	K (1.1)	Lecture group work discussion	Objective Q
1.2	describe the behaviors and properties of polymers as a function of their morphology, composition, thermal properties. ….etc *(M)*	K(1.2)	Lecture group work discussion	Short answer Questions

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**; (Upon completion of the course, student will be able to)			
2.1	Demonstrate the knowledge and skills required to calculate the rate of polymerization reaction and solve problems in molecular weight distribution as well as calculate activity ratios in copolymer equation …….. etc (M)	S(2.1)	lecture group work discussion	Solving Problems & chart analysis
2.2	Use communication and on line technology to prepare a report/poster on selected polymer chemistry topic (M)	S((2.4)	project-based learning Technology-enabled learning	Research presentation rubric
3.0	**Values, autonomy, and responsibility**; (Upon completion of the course, student will be able to)			
3.1	Act with integrity and good ethics in the chemistry profession and their obligation to society (M)	V(3.2)	Research activities	Ethic check rubric

C. Course Content

No	List of Topics	Contact Hours
1.	Nomenclature , classification, and synthesis of polymers	*4*
2.	Mechanisms and kinetics of free radicals- ionic polymerization	*4*
3	Copolymerization and copolymer equation	*4*
4	Polymer solution behaviors	*4*
5	Molecular weight distribution and polydispersity index	*4*
6	Thermal and mechanical properties	*4*
7	Techniques and applications of polymer chemistry	*4*
8	Presentation Session	*2*
	Total	30

D. Students Assessment Activities

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	HW	3-12	5
2.	Mid-term Exam1	6-8	15
3.	Mid-term Exam2	12-14	15
4.	Presentation Session	14	3
4.	Ethic check	14	2
5.	Final EXAM	16-17	60
Total			100

1. References and Learning Resources

Essential References	Introduction to Physical Polymer Science, Fourth Edition Author(s): L.H. Sperling 2006 John Wiley & Sons, Inc.
Supportive References	● Polymer Physics (Chemistry) by M. Rubinstein and Ralph H. Colby, 2003. Photochemistry, Past, Present and Future; Angelo Albini, Springer-Verlag Berlin Heidelberg 2016, ISBN 978-3-662-47976-6
Electronic Materials	Some course contents and materials are posted on Blackboard sites
Other Learning Materials	• https://www.longdom.org/scholarly/physical-chemistry-for-polymers-journals-articles-ppts-list-202.html • https://www.routledge.com/Polymers-for-Packaging-Applications/Alav • https://www.youtube.com/results?search_query=polymer+solutions • https://pubs.acs.org/doi/abs/10.1021/ed029p105. • https://chem.libretexts.org/Special:Search?qid=&fpid=230&fpth=&query=polymer+chemistry&type=wiki

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	1 Lecture room(s) for groups of 50 students

Items	Resources
Technology equipment (projector, smart board, software)	Smart board, Data show, Black board, internet
Other equipment (depending on the nature of the specialty)	none

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Likert-type Survey CES) Indirect
Effectiveness of students assessment	Instructor & Course coordinator	Class room evaluation (direct & indirect
Quality of learning resources	Program coordinator	Indirect
The extent to which CLOs have been achieved	Assessment committee	Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Physical Sciences Department Council
REFERENCE NO.	Psci2415
DATE	28/03/1446 Corresponding to 1 / 10 /2024

H. Attachments

1- Practical Work

None

2- Blue Print

Course Name	Chemistry of Polymer
Course Code	446 CHEM

PLOs	K1	K2	S1	S2	S3	S4	V1	V2
CLOs	1.1	1.2	2.1			2.2		3.1
Marks	12	21	62	---	---	3	---	2

Learning Domain	PLOs	CLOs	Assessment Type	Assessment Tool	No of Questions	Marks of the Assessment	Weight of the Assessment
Knowledge & understanding	K1	1.1 (12M)	HW	Objective Q	2	2	1
			Mid-term	Objective Q	4	2	4
			Final Exam	Objective Q	14	7	7
	K2	1.2 (21M)	HW	Objective Q	2	2	2
			Mid-term	Objective Q	5	5	6
			Final Exam	Objective Q	7	13	13
Skills	S1	2.1 (62M)	HW	Objective Q ,Solving Problems & chart analysis	3	3	2
			Mid-term	Objective Q ,Solving Problems & chart analysis	6	17	20
			Final Exam	Objective Q ,Solving Problems & chart analysis	8	40	40
	S4	2.2 (3M)	Research presentation	Research rubric	-	-	3
				PPT design	--	-	
				Oral discussion			
Value	V2	3.1 (2M)	Research ethic check	ethic check rubric			2
	TOTAL	100					100