مركز الاعتماد وضمان الجودة
ACCREDITATION & QUALITY ASSURANCE CENTER

The University of Jordan

Accreditation & Quality Assurance Center

Course Syllabus

Polymer Chemistry
0303452

QS STARS RATED FOR EXCELLENCE 2017

QS STARS RATED FOR EXCELLENCE 2017 TEACHING

1	Course title	**Polymer Chemistry**
2	Course number	**0303452**
3	**Credit hours (theory, practical)**	**3**
	Contact hours (theory, practical)	**3**
4	Prerequisites/corequisites	**5404232 (Management Information Systems)**
5	Program title	**B.Sc. Degree in Business Information Technology**
6	Program code	**02**
7	Awarding institution	**The University of Jordan**
8	Faculty	**Sciences**
9	Department	**Chemistry**
10	Level of course	**Bachelor**
11	Year of study and semester (s)	**2021-2022 / Summer Semester**
12	Final Qualification	**B.Sc. Degree in Chemistry**
13	Other department (s) involved in teaching the course	**N/A**
14	Language of Instruction	**English**
15	Date of production/revision	**1-6-2022**

16. Course Coordinator:

Instructor:	Dr. Abdussalam K. Qaroush
email:	a.qaroush@ju.edu.jo
Office Number:	38
Office Phone	22179
Office Hours:	Monday 15:00-16.00 Tuesday 15:00-16.00 Wednesday 15:00-16.00 Thursday 15:00-16.00 Or by appointment
Websites:	
Course Website	

17. Other instructors:

N/A

18. Course Description:

This course deals with nomenclature and types of polymers, the shapes and sizes of polymer molecules, molecular weight determination, polymer properties in solution and in the solid state. In addition, polymerization mechanisms and controlling end groups. Examples will illustrate selected applications. Together with more focus on the use of green chemistry as well as sustainable development goals when dealing with current industries to help mitigate the climate change global disruptions.

19. Course aims and Outcomes:

A- Aims:

This course is intended to give students an overview of the Business Intelligence (BI) topics. At the course completion, students will understand the fundamentals of the BI and they will be able to evaluate BI techniques to be used for certain applications.

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to …

A.	Summarizes historical evolution of the polymers.
B.	Categorizes polymers and manage to assign different methods for molecular weight determination.
C.	Use essential descriptions about polymer chemistry including structures and stereochemistry.
D.	Solves the problems about polymer chemistry (thermal and physical, and chemical properties).
E.	Categorizes polymerization reactions with respect to mechanisms and distinguishes differences of these reactions.
F.	Explains polymer production processes.

20. Topic Outline and Schedule:

1.

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference
Basic Principles Definitions, classification of polymers, polymerization reactions nomenclature	**1**	**AKYQ**	**A+B+C+D**	Written Evaluation	Text Book(s) Web Resources
Polymer Structure and Polymer Morphology Polymer morphology, interchain interactions, glass transition temperature, stereochemistry, polymer crystals, amorphous state, chemical and physical crosslinking	**2**		**A+B+C+D**	Written Evaluation	Main Text Book Web Resources
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	**2**		**A+B**	Written Evaluation	Main Text Book Web Resources
Chain Reaction Polymerization Addition reaction, free radical polymerization, monomers for radical polymerization, general chain addition reaction, initiators, chain reaction sequence, mechanism, steady state kinetics, chain transfer, commercial polymers, polymerization of dienes, copolymerization, polymerization techniques	**2**		**D+E+F**	Written Evaluation	Main Text Book Web Resources
Ionic and Coordination Polymerization Cationic polymerization, initiators, kinetics, anionic polymerization, initiators, kinetics, ionic copolymerization, coordination polymerization	**4**		**D+E+F**	Written Evaluation	Main Text Book Web Resources
Copolymerization General characteristics, composition drift, copolymer	**4**		**D+E+F**	Written Evaluation	Main Text Book Web Resources

equation, monomer reactivity, reactivity ratios and copolymer structure, structural effects & monomer reactivity ratios, classification of copolymers					
Green chemistry Why Green? Definition, Adaptation, development, application, sustainable development goals (SDGs) and green polymerization Methods	**5**		**A+B+C+D+E+F**	Written Evaluation	Main Text Book References
Presentations	**6-7**	Students	**A+B+C+D+E+F**	Written Evaluation	Main Text Book References
Final Exams	**8**	AKYQ	**A+B+C+D+E+F**	Written Evaluation	Main Text Book References

2.

21. Teaching Methods and Assignments:

Development of ILOs is achieved throughout:

1. Theoretical portions will be presented based on simple to complex examples, active learning, practical implementations and tests, case study(ies), discussion, self-study portions, real-world examples, and live demonstrations.
2. The students are asked to bring different samples of polymers in daily life during assessment or presentations to examine their physical properties, shapes, commodity use.

22. Evaluation Methods and Course Requirements:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

Written exams (covering theoretical understanding level, solving common problems and analytical thinking) is basically assessing ILOs in each chapter. **Deliverables and Group-work** discussions, solving problems, and presentations. **Discipline and active participation** are highly encouraged and will be measured according to in-class positive contributions, reviews, demonstrations, analytical thinking, or any extra deliverable related to module. **Students are highly encouraged to present their innovative and extraordinary contributions that will be rewarded by bonus marks.**

No	Evaluation Type	Weight	Date	Notes
1.	• Midterm Exam: Written exam covering knowledge, interpretation, and design skills.	30%	TBD	
2.	Activities/Presentations Quizzes 5% (2 quizzes at least) Deliverables 5% Final Presentation/Report 10% • *(Max will be counted/ 4 activities max)*	20%	TBD	
3.	• Final Exam: Overall summary of skills and basics, mechanisms and types of polymeric materials covered in class	50%	TBD	

A bonus of up to 2 marks will be given to innovative and brilliant active participation. May change depending on the submitted works (if properly submitted in front of the class).

Tentative Grading Scale:
A Mean Scale score based grading will be followed in class but not fixed scales following a normal distribution

23. Course Policies:

Discipline and Active Participation Policy (If applicable as a bonus, could be banned if it is insufficient):

All together discipline and active participation will be rewarded. **Attending the class by itself without any active participation does not permit having the 5% marks.**

- Participation frequency and relative grading percentage:
- Frequent is subject to 5% (good questions, valuable observations, and effective answers)
- Frequent semi-effective is subject to 3% (ineffective questions, observations, and answers)
- Infrequent is subject to 2% (ineffective and show low level of preparation)
- Rare is subject to 1%
- Displaying no sign of life or long periods of absence is subject to 0%

VERY IMPORTANT RULES AND REGULATIONS:

- **Late assignments/Hws delivery will result in losing one grade per day for each assignment/ homework (HW), and a ZERO grade if repeated.**
- **Plagiarism, forgery, or fabrication of data** is considered an unethical activity. It may result in having a penalty, refer to **www.plagiarism.org** as well as **students code of conduct**.
- **A**ttendance and participation are mandatory, absence (unexcused that can surpass 15% of the total lecture attendance) may result in receiving an **ABSENT FAIL** grade or an equivalent **failure** (F) grade.
- **S**tructured participation to avoid interruptions/random ones.
- **C**heating is not tolerated in class, with no exceptions, it will result in having a penalty according to regulation followed by the University of Jordan (UJ).
- **U**pdate yourself in reading the most recent (up to date) UJ regulations regarding course attendance and grading.

Notes:

- Concerns or complaints should be expressed to the course instructor lecturer; if no not resolved, the student is asked to communicate with the head of department (HoD) or higher hierarchical entities within School.

24. Required equipment:

Zotero, Dropbox, knowledge in MS office, laptop/ipad (for presentations only)

Extra Tools

BioChemdraw® (for drawing monomers/macromolecules).

25. References:

A- Required book (s), assigned reading and audio-visuals:

- **George Odian. (2004). Principles of Polymerization, 4th Edition. Wiley Interscience.**

B- Recommended books, materials, and media:

- **Khan Academy**, **Coursera**, **Edx**, and **YouTube** and whatsoever optional video-aided portals that deals with polymer chemistry.
- **Electronic Handouts**.
- R. B. Seymour and C. E. Carraher, Polymer chemistry-An Introduction, 3rd edition Marcel Dekker 1992.
- J. M. G. Cowie, Polymers: Chemistry and Physics of Modern materials, 2nd edition Blackie 1991.
- M. P. Stevens, Polymer Chemistry-An Introduction 2nd edition, Oxford Univ. Press, 1990.
- Ger Challa, Polymer Chemistry-An Introduction 3rd edition, Ellis Horwood, 1993.
- W. Billmeyer, Jr., Textbook of Polymer Science, 3rd edition, John Wiley, 1984.
- Young and Lovell, Introduction to Polymers, 2nd edition, Cambridge, Chapman & Hall, 1991.

Green Chemistry Textbooks

- P. T. Anastas, J. C. Warner, "**Green Chemistry: Theory and Practice**", 1998, Oxford University Press.
- Editor(s): Prof. Dr. Robert T. Mathers, Prof. Dr. Michael A. R. Meier. **Green Polymerization Methods**: Renewable Starting Materials, Catalysis and Waste Reduction, 2011, Wiley.

WebSites:

- www.knowledge-integrity.com
- See the list on the **UJ e-learning** website or much better to communicate via **MS Teams**

26. Additional information:

N/A

Name of Course Coordinator: Dr. Abdussalam K. Qaroush Signature: ----------

Date: ----------

Head of curriculum committee/Department: ---------- Signature: ----------

Head of Department: ---------- Signature: ----------

Head of curriculum committee/Faculty: ---------- Signature: ----------

Dean: ---------- Signature: ----------

Copy to:

Head of Department
Assistant Dean for Quality Assurance
Course File