



SYLLABUS

A. Course Description

Course Code	Course Num.	Course Name	Credit Hours	Lec.	Lab.	Tut.	Private study	Pre-requisites	Course Level	Language
CHM	428	Polymers & Petrochemicals	2	2	0	0	4	CHM 325	7	English

This course provides students with an introduction to Polymers Chemistry and Petrochemicals, methods of preparation, physical properties and application as well extended to Petrochemicals Process and Chemistry. Topics covered in the course include An Introduction to Polymer Chemistry, main synthetic methods including mechanism of Polymer, Reactions of Polymers, Distillation, Application in Petroleum Chemistry and Petrochemical Process. At the end of this course the student will be able to:

- Know in the fundamentals of Polymer's Chemistry and Petrochemicals as well as providing hands on experience and opportunities to develop transferable skills through the training course..
- Understand the importance of the subject to pursue their career in academia or industry.
- Describe the physical properties of different polymers will be one of the outcome, and combination with industrial process.

B. References: Required Textbook & Internal Website

I shall use

Principles of Polymerization, George Odian, (4th Ed.), John Wiley and sons Inc. Wiley Interscience, 2004, ISBN0-471-27400-3.

Students are required to purchase the textbook/materials (it is an obligation). The book contains the lecture notes as well as activities for the students to take part in; the book serves as a workbook. Other references:

- ***Contemporary Polymer Chemistry***, Harry R. Allcock, Frederick W., (3rd Ed.), Lampe and James E. Mark, Prentice Hall, 2003, ISBN: 0130650560.
- ***Textbook of Polymer Science***, Fred W. Billmeyer, (3rd Ed.), Wiley-Interscience, 1984, ISBN: 978-0-471-03196-3
- ***Polymer Science and Technology***, Joel R. Fried, (2nd Ed.), Prentice-Hall, 2003, ISBN-10: 0137039557

Google Classroom Webpage: <http://www.imamm.org/>

C. Topics Outline

Disclaimer: this is a very fast-paced course. There will be little time—if any—for review. What follows is an approximate outline of the pace of the course. We may go faster or slower, contingent on the class response. The tentative list of topics to cover:

- **An Introduction to Polymer Chemistry:** Types of Polymers and Polymerizations, Nomenclature of Polymers, Linear, Branched, and Crosslinked Polymers, Molecular Weight, Physical State, Applications of Polymers.
- **Step Polymerization (Condensation Polymerization):** Reactivity of Functional Groups, Step Polymerizations Other than Polyesterification, Catalyzed versus Uncatalyzed, Molecular Weight Control in Linear Polymerization, Molecular Weight Distribution in Linear Polymerization, Process



Conditions, Multi chain Polymerization, Crosslinking, Molecular Weight Distributions in Nonlinear Polymerizations, Crosslinking Technology, Polyesters, Unsaturated Polyesters, and Alkyds, Phenolic Polymers, Amino Plastics, Epoxy Resins, Polyurethanes, Step Copolymerization, Types of Copolymers, Methods of Synthesizing Copolymers, Block Copolymers, Utility of Copolymerization, High-Performance Polymers, Enzymatic Polymerizations.

- **Radical Chain Polymerization:** Nature of Radical Chain Polymerization, Structural Arrangement of Monomer Units, Experimental Determination of R_p , Initiation, Thermal Decomposition of Initiators, Redox Initiation, Molecular Weight, Chain Transfer, Inhibition and Retardation, Rate of Polymerization, Degree of Polymerization, Auto acceleration, Course of Polymerization, Molecular Weight Distribution, Polyethylene, Polystyrene, Vinyl Family, Poly(vinyl chloride), Polymerization of Dienes.
- **Reactions of Polymers:** Other Reactions, Graft Copolymers, Radical Graft Polymerization, Vinyl Macro monomers, Chain Transfer and Copolymerization, Ionizing Radiation, Redox Initiation, Living Radical Polymerization, Anionic Graft Polymerization, Cationic Graft Polymerization, Other Approaches to Graft Copolymers, Block Copolymers.
- **Distillation, Application in Petrochemistry and Petrochemical Process:** Distillation and Distillation Categories, Processing Mode, Processing Sequence, System Types, Reactions, How Oil Formed, Oil Refining, Oil Production, Oil Process, Chemistry of Petrochemical Process.

D. Exams & Grading System

The semi-official dates of the exams for this course, with all the caveats, that the word “semi-official” entails, can be found here:

- **Midterm 1:** 6th or 7th week & **Midterm 2:** 11th or 12th week
- **Quizzes & Homeworks:** During the semester

Your course grade will be based on Final Exam, Midterms, Homework, Quizzes, Participation, Attendance and Project.

Midterm 1: 20 %	Midterm 2: 20 %	Final Exam: 40 %
Quizzes; Homework & Attendance & Participation: 20 %		

Grading distribution:

A+: [95, 100], A: [90, 95), B+: [85, 90), B: [80, 85), C+: [75, 80), C: [70, 75), D+: [65, 70), D: [60, 65), F: [0, 60).

E. Student Attendance/Absence

Only three situations will be considered as possible excused absences:

- Occurrence of a birth or death in the immediate family will be excused. (“Immediate family” is defined by the University as spouse, grandparents, parents, brother, or sister).
- Severe illness in which a student is under the care of a doctor and physically unable to attend class will be excused. Students are not excused for a doctor's appointment. Do not make appointments that conflict with rehearsals. Notes from the University Health Center will be accepted.

[Executive Rules for Study Regulations and Examsgoo.gl/ykm7t3](https://Examsgoo.gl/ykm7t3)

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