



MT 260 August 3:0

Polymer Science and Engineering – I

Instructor

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Teaching Assistant

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Department: Materials Engineering

Course Time: MWF 12 - 1

Lecture venue: Lecture theatre, Department of Materials Engineering

Detailed Course Page: <http://materials.iisc.ernet.in/~praveen/>

Announcements

Brief description of the course

Basics of polymers and physical chemistry of polymers, structure property relationships will be taught.

Students with no background in polymers will be introduced to the subject.

Prerequisites

None

Syllabus

Fundamentals of polymer science. Polymer nomenclature and classification. Current theories for describing molecular weight, molecular weight distributions. Synthesis of monomers and polymers. Mechanisms of polymerization reactions. Introduction to polymer processing (thermoplastic and thermoset). Structure, property relationships of polymers: crystalline and amorphous states, the degree of crystallinity, cross-linking, and branching. Stereochemistry of polymers. Instrumental methods for the elucidation of polymer structure and properties; basic principles and unique

problems encountered when techniques such as thermal (DSC, TGA, DMA, TMA, TOA), electrical (conductivity, dielectric), and spectroscopic (IR, Raman, NMR, ESCA, SIMS) analysis GPC, GC-MS, applied to polymeric materials. Advanced materials and device physics; conducting polymers and organic devices.

Course outcomes

Basics of polymers to physical chemistry of polymers, structure property relationship and processing techniques.

Grading policy

Quizzes 25%

Research paper 25%

Research project 30%

Final exam 20%

Assignments

Research paper,

Group research project

in class presentation of both research paper and project

Resources

Soft and hard copy of these books are made available to the students

1. Principles of Polymerization, Odian
2. Textbook of Polymer Science, F. W. Bilmeyer
3. The Elements of Polymer Science and Engineering, A. Rudin
4. Plastic Materials, J. A. Brydson
5. Surface Analysis, J. C. Vickerman