

# Science and Technology of Polymers - Video course

## COURSE OUTLINE

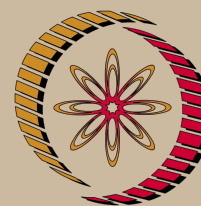
The main theme of the course on Science and Technology of Polymers is to focus understanding of science and technology of polymer synthesis and its characterization. Knowledge on solid state structure and properties of polymers will enable their proper selection for applications in domestic as well as industrial appliances.

As per the need of the day the essentiality of biodegradation of stable commodity as well as engineering polymers vis-a-vis design and development of biodegradable polymers have become a priority. Polymers have been established as very promising materials in electronic and medical implant devices.

Being a very good tailoring material polymer can be easily modified to suit a specific application provided there is knowledge in structure and properties of polymers. In order to prepare a suitable polymer product some input is necessary in compounding and processing behavior of polymers both in solution and melt state followed by product fabrication involving machineries. This course will highlight the above areas including polymer composites.

## COURSE DETAIL

Sl. No	Topic	Hours
1.	Basic concepts on polymers.	2
2.	Polymer raw materials.	1
3.	Polymerization principles and processes (step, chain and other polymerizations, polymer kinetics).	6
4.	Polymerization techniques.	2
5.	Polymer manufacture (unit operations, polymer reactors, polymer isolation, handling and storage).	4
6.	Polymer structure and property.	6
7.	Polymer characterization.	2
8.	Polymer modification.	2
9.	Multicomponent polymeric materials (polymer miscibility, polymer blends and alloys, filled plastics, polymer composites).	4



NP-TEL

# NPTEL

<http://nptel.iitm.ac.in>

## Metallurgy and Material Science

### Pre-requisites:

Background in chemistry and physics

### Additional Reading:

Any basic book on polymer science and technology.

### Hyperlinks:

Will be given as video lecture progresses and will be embedded in web course

### Coordinators:

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10.	Polymer compounding and fabrication (polymer additives, Compounding processes, fabrication techniques, post fabrication operations).	5
11.	Polymer testing (sample preparation, testing standards and methods, analysis of polymer and additives).	2
12.	Polymer applications: Biodegradable polymers, biomedical polymers, conducting polymers.	10
13.	Problems with polymers (thermo oxidative degradation, fire hazards, toxicity, effluent disposal, feedstock scarcity).	2

**References:**

1. Fred W. Billmeyer, Jr., Textbook of Polymer Science, 3rd Edition, John Wiley & Sons, Singapore, 1994.
2. George Odian, Principles of Polymerization, Second Edition, John Wiley & Sons, New York, 1981.
3. Charles E. Carraher, Jr., Seymour/Carraher's Polymer Chemistry, 5th Edition, Marcel Dekker, Inc., New York, 2000.
4. Premamoy Ghosh, Polymer Science and Technology, Second Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2002.
5. John Brydson, Plastic Materials, Seventh Edition, Butterworth-Heinemann, An Imprint of Elsevier, New Delhi, 1999.
6. Werner Hofmann, Rubber Technology Handbook, Hanser Publishers, Munich, 1989.
7. Sujata V. Bhat, Biomaterials, Narosa Publishing House, New Delhi, 2002.
8. Martin Alexander, Biodegradation and Bioremediation, second Edition, Academic Press, London, 1999.
9. D.F. Williams, Editor-in-chief, Biomaterials, Vol. 24, No. 13,(2003) 2123-2442.