

Fundamental of Polymer and Petrochemical

- 1.1 Course Number: CH191
- 1.2 Contact Hours: 2-0-0 Credits: 6
- 1.3 Semester-offered: 2nd Year-Even
- 1.4 Prerequisite: Not Required
- 1.5 Syllabus Committee Member: Dr Vivek Kumar, Dr U Ojha

2. Objective: The course will provide basic knowledge about the polymers and petrochemicals. The classification, basic properties and utility of these materials will be discussed in the course. The method of polymer preparation, thermal and mechanical properties along with processing of polymers will be taught as a part of the course. Several commercially important polymers such as polyurethane, polyvinyl chloride, polyethylene, polypropylene and polyester commercial scale synthesis, processing and utilization will be discussed during the course.

3. Course Content:

Unit wise distribution of content and number of lectures

Unit	Topics	Sub-topic	Lectures
1	Introduction to Petrochemicals	Introduction to petrochemicals, classification, raw materials, originating source	3
2	Manufacturing process of Chemicals from methane	Manufacturing process of methanol, Acetic acid, Vinyl Acetate, Poly Vinyl Acetate	5
3	Manufacturing process of chemicals from ethylene	Manufacturing process of Ethylene, Low density polyethylene, High density polyethylene, Vinylchloride monomer, Polyvinylchloride, Ethylene oxide and Ethylene glycol	8
4	Other Processes	Manufacturing process of styrene, Polystyrene, Styrene butadiene rubber	4
5	Introduction to Polymers	Classification of polymer, molecular weight, mechanical properties, thermal properties, monomer	4
6	Category of polymers	Conducting polymers, biopolymers, liquid crystalline polymer, shape memory polymers, hyper branched polymer & dendrimers	6

		Structure-property correlation in polymers	4
7	Methods for polymer synthesis	Step growth, chain growth, radical, leaving polymerization	4
		Polymer properties, rheology and processing tools	2
Total			40

4. Readings

4.1 Text Books:

1. L.H. Sperling, Introduction to Physical Polymer Science, 4th Edition
2. Fred W. Billmeyer, Jr., Textbook of Polymer Science 3rd Ed., Wiley, New York, USA, 1984.
3. G. Odian, Principles of Polymerization, 3rd Ed., Wiley, New York, 1991
4. F. Rodriguez, Principles of Polymer Systems, 5th Ed, McGraw Hill, New York, 2003.
5. Manas Chanda, Introduction to polymer science and chemistry, CRC Press

4.2 Reference Books:

1. Werner Pauer , Polymer Reaction Engineering of Dispersed Systems.

5. **Outcome of the Course:** The students will understand different petrochemical products and their manufacturing processes. The students will also be able to understand different categories of polymers, their synthesis and properties.