



# **Sree Narayana Mangalam College Maliankara**

*(Affiliated to Mahatma Gandhi University, Kottayam)*

## **CERTIFICATE COURSE SYLLABUS**

### **Polymer science**

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# Certificate Course on Polymer Science

## Objectives of the Course:

- ✓ Students will be able to understand Different kind of polymers and their properties
- ✓ Acquire the skills to explain factors like nature of monomer, type of initiator, emulsifiers etc. to produce polymer of desired physical form.
- ✓ Understand Analyze the various recycling methods used for thermosets, thermoplastic and rubbers waste.
- ✓ Students will be able to understand Properties and applications of engineering polymers.
- ✓ Learn preparation of thermoplastic polymers Learn preparation of thermosetting polymers

## Course Overview:

This course will educate the students on the subject of polymers that constitute one of the most important materials used presently. The course will include fundamentals of synthesis, characterization, properties and also include discussion on the applications of polymers, The goal of this course is to provide students with an introduction to the various methods and techniques of polymerization reactions, their chemistry, mechanism, structures, properties and applications. source, composition, conditions, molecular weight, geometry, and Nomenclature of polymers.

## **Duration of the course: 30 Hours**

### **Module I**

General- Introduction to polymers , classification of polymers on the basis of source, elemental composition, heat, pressure, chemical reactivity, chemical/monomer composition, geometry and stereo regularity. Nomenclature of polymers. **(6 Hours)**

### **Module II**

Mechanism of polymerization- Definition of polymerization, factors affecting on polymerization, Addition polymerization (free radical, ionic and co-ordination polymerization). Condensation and Ring opening polymerization. Redox and Living radical polymerization. **(7 Hours)**

### **Module III**

Engineering Polymers: Unsaturated polyester resin, Epoxy resins, phenolic resins, Aminoresins, Alkyds. Properties and applications of engineering polymers: Nylons, polyesters, PAN, PC, PU, ABS, Polyacrylates and allied polymers, Fluoropolymers, **(5 Hours)**

### **Module IV**

polymer molecular weight: Importance of molecular weight control. Arithmetic mean-molecular weight, Weight average molecular weight, **M<sub>w</sub>**, number –average molecular weight, **M<sub>n</sub>** and viscosity average molecular weight **M<sub>v</sub>**. Molecular weight distribution and its importance from the point of applications.**(7 Hours)**

### **Module V**

Physical properties of polymers in relation to chemical structure: volumetric properties- volume and density, thermal expansion, calorimetric properties- heat capacity, enthalpy, and entropy. **(5 Hours)**

## **Suggested Readings**

1. P.S.Kalsi: Spectroscopy of organic compounds (New Age)
2. Principles of Instrumental analysis, 5th edition, D.A.Skoog, F.J.Holler, T.A.Nieman, Philadelphia Saunders College Publishing (1988)
3. Plastic Materials-Brydson
4. Rubbery materials and their compounds-Brydson.
5. Rubber Technology and manufacture-C.M. Blow