

DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE-7)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credit s	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lectur e	Tutoria l	Practical / Practice		
BIO-BASED AND BIODEGRADABLE POLYMERS	4	2	0	2	Class 12th with Physics, Chemistry	---

Learning objectives

The Learning Objectives of this course are as follows:

- To gain knowledge of biopolymers and their isolations
- To acquire knowledge on structure and properties of biopolymers
- To understand the basic applications of various biopolymers

Learning outcomes

After studying this paper, students will be able to:

- Explain the applications of bio-based and biodegradable polymers
- Distinguish and analyse biopolymers
- Evaluate the strength and properties of polymers

SYLLABUS OF DSE-7

THEORY COMPONENT-

UNIT 1

(12 Hours)

BASICS TO BIOPOLYMERS & NATURAL MACROMOLECULES

Introduction to the concept of Bio Based Polymers and Biodegradable Polymer. Significance, classifications, properties and applications of biopolymers and natural polymers such as Starch, cellulose, chitosan, gelatine, protein, fatty acids, lipids, aliphatic polyesters (PLA, PHB), cellulose

UNIT 2

(8 Hours)

PROCESSING

Isolation, processing of biopolymers: composite formation, blending and solvent casting

UNIT 3

(10 Hours)

APPLICATIONS

Applications of biopolymers in packaging, biomedical testing and devices, agriculture: soil conditioning and micro-nutrient delivery

PRACTICAL COMPONENT

(60 Hours)

- To determine the molecular weight of biopolymers.
- Isolation of starch from wheat/rice/potato
- Isolation of gelatin from natural resources.
- To prepare Poly(lactic acid).
- To prepare a chitosan based composite for biomedical applications.
- To prepare blends of natural polymers and find out miscibility
- Develop a biodegradable film by solution casting of biopolymers.
- Estimate the biodegradability by soil burial test.
- Evaluate swelling index, porosity, hardness of a film.
- Estimate the water vapor transmission rate of a biopolymeric film.

ESSENTIAL/RECOMMENDED READINGS

- Byrom D., (1991) Biomaterials: Novel Materials from Biological Sources, First Edition, Macmillan Publishers Ltd.
- Bastioli C., (1987) HandBook of Biodegradable polymers, Rapra Technology.
- Niaounakis M., (2015) Biopolymers: Processing and Products, First Edition, Elsevier Inc.

SUGGESTIVE READINGS

- Johnson R.M., Mwaikambo L.Y., Tucker N., (2003) Biopolymers, Rapra Technology.
- Pilla S., (2011) Hand Book of Bioplastics & Biocomposites for Engineering Applications, Wiley.
- Alexander S., (2003) Biopolymers, Vol. 1, Wiley.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.