



**Gyanmanjari**  
Innovative University

Course Syllabus  
Gyanmanjari Science College  
Semester-3 (B.Sc)

**Subject:** Polymer and Nuclear Chemistry-BSCCM13309

**Type of course:** Major

**Prerequisite:** Learner should possess basic knowledge of chemistry and molecules.

**Rationale:** Polymer chemistry teaches about various polymers like plastics, rubber, fibre.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	SEE		CCE			
				Theory	Practical	MSE	LWA/V	ALA	
3	0	2	4	75	25	30	20	50	200

*Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; MSE- Mid Semester Examination; LWA - Lab Work Assessment; V – Viva voce; CCE-Continuous and Comprehensive Evaluation; ALA- Active Learning Activities.*

**Course Content:**

Unit No	Course content	Hrs	% Weightage
1	<p><b>Chapter-1: Introduction of polymer:</b></p> <ul style="list-style-type: none"> <li>• Introduction, Rise of polymer science and early industrial developments</li> <li>• Definition of monomer, polymer, repeating units and polymerization</li> <li>• Classification of polymers</li> <li>• Natural, synthetic and Semi synthetic polymers</li> <li>• Linear polymers, branched polymers, Cross linked polymers</li> <li>• Homopolymer or copolymer</li> </ul>	15	25%



	<ul style="list-style-type: none"> <li>• Thermoplastic and thermosetting, fibres, plastics or elastomers etc.</li> </ul> <p><b>Chapter-2 Co-Polymerization</b></p> <ul style="list-style-type: none"> <li>• Basic methods of polymerization: Addition and condensation.</li> <li>• Industrial Production, Properties and Applications of addition Co-Polymer Materials: Buna – S, Buna – N</li> <li>• Industrial Production, Properties and Applications of condensation Co-Polymer Materials: Nylon- 6,6 Nylon-6, Melamine, Bakelite</li> </ul>		
2	<p><b>Chapter-3 Preparations of Polymers</b></p> <ul style="list-style-type: none"> <li>• Low density polythene-LDP</li> <li>• High density polythene-HDP</li> <li>• Polytetrafluoroethylene (PTFE)</li> <li>• Polyacrylonitrile (PAN)</li> <li>• Polyvinylchloride(PVC)</li> <li>• Polystyrene</li> <li>• Terylene</li> <li>• Polyepoxide</li> </ul> <p><b>Chapter- 4 Rubber and Biopolymers</b></p> <ul style="list-style-type: none"> <li>• Molecular mass of polymer Natural Rubber</li> <li>• Vulcanized Rubber</li> <li>• Synthetic Rubber</li> <li>• Preparation, Properties and Uses of Neoprene Rubber</li> <li>• Biopolymers- Biodegradable &amp; Non biodegradable</li> <li>• PHBV &amp; Nylon 2,6</li> </ul>	10	25%
3	<p><b>Chapter-5</b></p> <ul style="list-style-type: none"> <li>• Radioactivity</li> <li>• Types and properties of radiations</li> <li>• Detection and measurement of radioactivity</li> <li>• Types of radioactive decay</li> <li>• Radioactive disintegration series</li> <li>• Rate of radioactive decay</li> <li>• Units of radioactivity</li> <li>• Half-life &amp; average life</li> <li>• Radioactive equilibrium</li> <li>• Radioactive dating</li> </ul>	10	25%



4	<b>Chapter-6</b>	10	25%
	<ul style="list-style-type: none"> <li>• Nuclear reactions</li> <li>• Nuclear fission reactions</li> <li>• Nuclear fusion reactions</li> <li>• Nuclear equations</li> <li>• Artificial radioactivity</li> <li>• Nuclear isomerism</li> <li>• Energy released in nuclear reactions</li> <li>• Mass defect</li> <li>• Nuclear binding energy</li> <li>• Neutron-proton ratio and nuclear stability</li> <li>• Nuclear chain reaction</li> <li>• Nuclear energy and the Atomic Bomb</li> <li>• Nuclear reactor</li> <li>• Hydrogen bomb</li> </ul>		

**Continuous Assessment:**

Sr. No	Active Learning Activities	Marks
1	<b>Everyday Polymer:</b> Students need to identify products which are made of polymer and used in day to day life. List our atleast 25 examples and upload it to GMIU web Portal.	10
2	<b>Polymer Model Building</b> Provide students with templates or instructions to create paper models representing different polymer structures And upload it to GMIU web Portal.	10
3	<b>Nuclear Accidents:</b> Present real world case studies related to nuclear accidents in detail and submit it to GMIU Web portal	10
4	<b>Indian Nuclear Power Program:</b> Student need to submit a brief report on Indian Nuclear power Program and upload it on GMIU Web portal	10
5	<b>Attendance</b>	10
Total		50





**Suggested Specification table with Marks (Theory):75**

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	35%	30%	35%	00	00	00

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**Course Outcome:**

After learning the course the students should be able to:	
CO1	Classify polymers and understand various methods of Co-polymerization & it's materials.
CO2	Identify the different preparations for various types of polymer. Identify rubber and biopolymers.
CO3	Gain the knowledge of the fundamentals of Nuclear Chemistry
CO4	Understand various nuclear reactions and details about nuclear and hydrogen bomb

**List of Practical:**

Sr. No	Descriptions	Unit No	Hrs
1	Organic Spotting : Single compound (Minimum 05 compounds)	ALL	16
	Spotting of organic compounds having mono and bi-functional groups with conformation and derivatives of above groups.		14
2	Preparation of polymers		
		Total	30

**Instructional Method:**

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.



From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

### Reference Books:

- [1] Engineering Chemistry by JAIN & JAIN, Dhanpat Rai and Sons publication
- [2] Understanding Chemistry by C.N.R. Rao, World scientific publishing Co.
- [3] Engineering Chemistry by Shikha Agarwal, Cambridge Uni. Press, New Delhi
- [4] Physical Chemistry by Bahl and Tuli, S. Chand Publication
- [5] Essentials of Nuclear Chemistry by H. J. Arnikar, New Age International Publisher

