

Department of Chemistry

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE OUTLINE			
Course Title	Polymer Chemistry		
Course Code	CH 620	No. of Credits	3 (Theory)
Department	Chemistry	Faculty	Dr. V.M. Biju,
Programme	M.Sc.(Chemistry)		
Course Coordinator	Dr. V.M. Biju		
E-mail	vmbiju@nitt.edu	Telephone No.	2503638
Course Type	<input type="checkbox"/> Core course	<input checked="" type="checkbox"/> Elective course	
COURSE OVERVIEW			
<p>This course is offered to I year M.Sc.(Chemistry) students. This 3 credit course is for theory. Three theory classes will be conducted per week.</p>			
COURSE OBJECTIVE			
<p>To introduce the basic concept of macromolecules, polymerization processes, polymer stereochemistry, theory of polymer solutions and speciality polymers to the I year M.Sc. students.</p>			
COURSE OUTCOMES (CO)			
<p>Students would become familiar with the:</p> <ul style="list-style-type: none"> ✓ Natural and man-made polymers ✓ Polymerization methods ✓ Polymerization kinetics ✓ Uses of polymers for commercial purposes 			
COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	Week	Topic	Mode of Delivery
1	I week of January	<u>Unit-I</u> Principle of duality and molecular design-tetrahedral model of product development.	C&T, PPT
2	II week of January	Nomenclature and classification. Raw material for the synthesis of polymers.	C&T, PPT
3	III week of January	Synthetic schemes. Petroleum and petrochemicals - Naphtha as a source of petrochemicals.	C&T, PPT
4	IV week of January	<u>Unit-II</u> Free radical addition polymerization- kinetics	C&T, PPT

		and mechanism. Chain transfer. Molecular weight distribution and molecular weight control.	
5	I week of February	Cationic and anionic polymerization: Kinetics and mechanism. Living polymers. Step growth polymerization - Linear Vs cyclic polymerization.	C&T, PPT
6	II week of February	Other methods of polymerization- bulk, solution, melt, suspension, emulsion and dispersion techniques.	C&T, PPT
7	III week of February	Unit-III Configuration and conformation. Tacticity. Chiral polymers. Polymer characterization.	C&T, PPT
8	IV week of February	Molecular weights- Methods for determining molecular weights- static, dynamic, viscometry, light scattering and GPC.	C&T, PPT
9	I week of March	Crystalline and amorphous states. glassy and rubbery States. Glass transition temperature and crystalline melting of polymers. Degree of crystallinity-X-ray diffraction. Thermal stability of polymers.	C&T, PPT
10	II week of March	Unit-IV Flory-Huggins theory. Chain dimension-chain stiffness. End-to-end chain distance of polymers.	C&T, PPT
11	III week of March	Conformation-random coil, solvation and swelling. Determination of degree of cross linking and molecular weight between cross links.	C&T, PPT
12	IV week of March	Industrial polymers- synthesis, structure and applications of industrially important polymers.	C&T, PPT
13	I week of April	Unit-V Polymers as aids in organic synthesis. Polymeric reagents, catalysts, substrates. Liquid crystalline polymers-Main chain and side chain liquid crystalline polymers.	C&T, PPT
14	II week of April	Phase morphology. Conducting polymers - Synthesis & applications of polyacetylenes, polyanilines, polypyrroles & polythiophenes.	C&T, PPT
15	III week of April	Photoresponsive and photorefractive polymers. Polymers in optical lithography- Drug delivery- Drug carriers- Polymer based nanoparticles.	C&T, PPT

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
Theory				
1	Assignment	I week of February	One week	5
2	Test I	II week of February	60 minutes	20
3	Seminar	III week of March	10 minutes each	5

4	Test II	IV week of March	60 minutes	20
5	End semester	IV week of April	3 hours	50

Theory = Total (100)

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

1. F.W. Billmeyer. Textbook of Polymer Science. 3rdEdn, Wiley. N.Y. 1991.
2. J.M.G Cowie. Polymers: Physics and Chemistry of Modern Materials. Blackie. London, 1992.
3. R.J.Young, Principles of Polymer Science, 3rdEdn. , Chapman and Hall. N.Y., 1991.
4. P.J. Flory. A Text Book of Polymer Science. Cornell University Press. Ithacka, 1953.
5. F. Ullrich, Industrial Polymers, Kluwer, N.Y., 1993.
6. H.G.Elias, Macromolecules, Vol. I & II, Academic, N.Y. 1991.
7. J.A.Brydson, Polymer chemistry of Plastics and Rubbers, ILIFFE Books Ltd., London, 1966.

COURSE EXIT SURVEY

1. Feedback from students during class committee meetings.
2. Anonymous feedback through questionnaire at the end of the semester.

COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)

1. 75% attendance is compulsory for the course.
2. For those who missed Test I and Test II due to genuine reasons, retest will be conducted during the III week of April 2017.

ADDITIONAL COURSE INFORMATION

The faculty will be available for consultation at times as per the intimation by the faculty.

Coordinator *[Signature]* CC-Chairperson *[Signature]* HOD *[Signature]*

(O.S.V.-M.B.S.V)

4/1/17