PTFE 4140 POLYMER SOLUTIONS AND SURFACES
Credit: 3-0-3

Course Coordinator: **Dr. Mohan Srinivasarao**

Prerequisites: CHEM 3411 and (PTFE 4775 or PTFE 4777)

Catalog Description: Physical chemistry of polymer solutions, polymer miscibility, adsorptions, sorptions, plasticization, molecular weights, molecular weight distributions. Study of polymer surfaces.

Course Learning Objectives:
1. Learn essential concepts of the physical chemistry vis-à-vis properties of polymer solutions.
2. Provide a foundation for accessing advanced literature in polymer solution theory.
3. Provide a foundation for advanced graduate research in polymer solutions and phase behavior.

Textbook: M. Rubenstein, R. Colby, Polymer Physics, Oxford University Press, New York, 2003

Topical Outline of Lectures and Laboratories
1. What are polymers?
2. Why do they behave differently from other materials?
3. What are the chain characteristics?
4. How do polymers behave in solution?
5. What is the phase diagram of a polymer in solution?
6. How do the properties change when the polymer added to a solvent has a rodlike nature as opposed to random chain conformation?
7. How do polymer chains move in melt or solution?
8. Discussion of rheological properties.

Course Outcomes: Specifically, at the end of the course the students will be able to: *
1. Apply an integrated understanding of polymer behavior to design appropriate experiments to measure polymer properties [2,3].
2. Perform appropriate property determination estimations to predict thermal, rheological and solubility characteristics of polymer [1,13].
3. Demonstrate a knowledge of the procedures and parameters (both in theory and in practice) used in determining polymer properties using physical models for the conformation of polymer chains [2,3,4].
4. Able to provide a molecular interpretation for the observed macroscopic properties of bulk polymers [2,3,4].
5. Analyze experimental data using scientific and engineering knowledge [1,2,13].
6. Be able to critique and write "referee" type reports for problems dealing with polymers in the melt or in solution [8,9].
7. Communicate the significance of the experiments in terms of contribution to fundamental scientific understanding of polymer structure/properties and relevance to engineering/industrial practice and end-use performance [9,10].

* Numbers in Brackets refer to PFE Program Outcomes to which the Course Outcomes relate.

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