

## ChE 442 – SENIOR LABORATORY II

Type (check one): Required:   X   Elective:       

**2005-2006 Catalog Data:** ChE 442. Senior Laboratory II. Topics include experimental study of Reaction Kinetics and behavior of various reactors, polymerization and characterization of polymers. Both written and oral reports are required on experimental results. Prerequisite: ChE 443. Offered in the Spring semester. *One semester, one credit.*

**Prerequisites:** ChE 443

**Co-Requisites:** None

**Textbook:** Departmental Laboratory Handouts

**Other Required Materials:** None

**Other References:** None

**Instructor:** Dr. Asit K. Ray, Professor of ChE

**Course Objectives:**

1. To apply classroom knowledge acquired to:
  - (a) run laboratory batch, CSTR & PRF reactors
  - (b) polymerize styrene and analyze the polymeric products
2. Present experimental data orally and in written form

**Prerequisites by Topics:** Process modeling and control

**Topics:**

1. Learn how to use product characterization instruments.
2. Operate the batch-reactor and derive kinetic data to be used for analyzing CSTR and plug flow reactor data.
3. Operate the CSTR and derive kinetic data.
4. Operate the plug flow reactor and derive kinetic data.
5. To study different types of addition polymerization (suspension, emulsion) in batch reactors.
6. Calculate the intrinsic viscosity and molecular weights of the polymers made.
7. Study the thermal properties of these polymers (glass transition temperature, melting point, crystallinity, etc.) using thermal analysis.

**Class Schedule:** One 3-hour session per week

**Prepared by:**   Asit K. Ray, Ph.D.   **Date:**   September 2005

**Professional Component:  
ChE 442 – SENIOR LABORATORY II**

|   |  |
|---|--|
| Category<br>(check one)                         | <input type="checkbox"/> Math/Basic Science<br><input checked="" type="checkbox"/> Engineering<br><input type="checkbox"/> General Education<br><input type="checkbox"/> Other   |
| Design<br>(check one)                           | <input type="checkbox"/> Significant<br><input checked="" type="checkbox"/> Some<br><input type="checkbox"/> None  |
| Realistic Constraints<br>(check all that apply) | <input type="checkbox"/> Economic<br><input checked="" type="checkbox"/> Environmental<br><input type="checkbox"/> Sustainability<br><input checked="" type="checkbox"/> Manufacturability<br><input type="checkbox"/> Ethical<br><input checked="" type="checkbox"/> Health & Safety<br><input type="checkbox"/> Social<br><input type="checkbox"/> Political |

**Relationship to Program Outcomes:**

Check all that apply:

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs
- (d) an ability to function on multi-disciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i) a recognition of the need for and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice