

**CBE 459**  
**PRODUCT AND PROCESS SYSTEM DESIGN PROJECTS**

**SPRING 2019**

**Instructor:** Bruce M. Vrana and most CBE Faculty Members

**Course Description:** Design of a chemical product and/or process based on recent advances in chemical engineering technology. Weekly design meetings with faculty advisor and industrial consultants. Comprehensive design report and oral presentation.

**Text:** None

**Course Outline:**

The course is devoted entirely to the solution of design problems in groups of three or four students. Timely problems are provided mostly by consultants from the local chemical industry who visit the University on Tuesday afternoons to assist the students throughout the Spring semester.

**Course Learning Objectives:**

1. Enable teams of two, three, or four seniors to solve individual, timely and challenging design projects, usually provided by industrial consultants or faculty, during the course of the spring semester
2. Permit all of the students to become acquainted with the solution of typically 7-10 design projects being carried out by 7-10 design teams in the senior class. And encourage the teams to communicate newly discovered ideas and concepts to the other teams.
3. Enable the design teams to take advantage of interacting regularly, at least 1 hour/week, with many experienced chemical engineers in industry, our *industrial consultants*.
4. Permit the students to apply the techniques for product and process design taught in CBE 400 and throughout the entire chemical engineering curriculum. And expect the students to learn and apply real-world techniques to their projects that result from the interaction with their industrial consultants
5. Give most of the students their first experience in solving a major open-ended problem, putting into practice many of the analytical techniques learned in their chemical engineering courses.
6. Enable the students to learn to use computer packages for product and process design more critically, checking results carefully to ascertain their validity and applicability
7. Allow the students to obtain practical experience in using information resources, especially the patent literature

8. Teach the students to seek economically attractive designs, using the methods for costing and profitability analysis taught in CBE 400
9. Expose the students to design strategies when working with approximate uncertain, technical information
10. Give each design group the opportunity to write a major design report, one that will be both printed and published electronically in Scholarly Commons for posterity as PDF files (see [http://repository.upenn.edu/cbe\\_sdr/](http://repository.upenn.edu/cbe_sdr/)). Enable the students to present their designs orally to the chemical and biomolecular engineering faculty and our industrial consultants.
11. Provide a learning environment to foster creative thinking; to look for the unobvious solution; to encourage the melding of their ideas and knowledge with those of faculty and consultants; to invent a creative solution
12. Understand, recognize, and comply with the need for urgency in completing the assigned project as industry will demand.