

# CME 441

## Process Engineering and Design II

**Credits and Contact Hours:** 3 credits; 3 hours 0 minutes

**Course Instructor:** Devinder Mahajan

**Text(s):**

1. Seider, W.D., Seader, J.D., and Lewin, D.R., *Process Design Principles: Synthesis, Analysis, and Design*, John Wiley & Sons, Ltd., December 2008 and 2009. ISBN 978-0-470-04895-5.
2. Svrcek, W.Y., Mahoney, D.P., Young, B.R., *A Real-Time Approach to Process Control*, 2<sup>nd</sup> ed., John Wiley & Sons, Ltd., 2006.

**Specific course information**

**a.** Review of engineering design principles; engineering economics, economic evaluation, capital cost estimation; process optimization; profitability analysis for efficient and accurate process design. HAZOP analysis. Application of CHEMCAD in a commercial process. Final process flowsheet design preparation incorporating engineering standards.

**b.** U3 or U4 standing in CME, CME 401, CME 440.

**c.** Required course

**Specific goals for the course:**

1. Use modern tools such as Computer-aided design
2. Learn key assumptions that underlie the design of chemical plants and their comparative merits.
3. Apply methods utilized for process optimization.
4. Learn all phases of process design of a chemical plant.

<b>Criterion 3 a-k: Outcomes</b>	<b>%contribution</b>
a. Ability to apply knowledge of math, engineering, and science	20%
b1. Ability to design and conduct experiments	15%
b2. Ability to analyze and interpret data	15%
c. Ability to design system, component or process to meet needs	10%
d. Ability to function on multi-disciplinary teams	10%
e. Ability to identify, formulate, and solve engineering problems	15%
k. Ability to use techniques, skills, and tools in engineering practice	15%
Any other outcomes and assessments?	100%

**Brief list of topics to be covered (including exams/quizzes):**

Week 1	Chemcad Tutorial- II
Week 2	Engineering Ethics in workplace: hazardous waste disposal, clean air, code violations topics
Week 3	Heuristics of process synthesis, reactor design and selection for chemical reactions.
Week 4	Environmental and safety considerations – alternate process design for waste minimization.
Week 5	Design elements- HAZOP analysis
Week 6	Preliminary design layout- flowsheet preparation
Week 7	Company Visit- <ul style="list-style-type: none"><li>- Meet with the Industrial Mentor</li><li>- Ppt presentation</li><li>- Project Evaluation</li></ul>
Week 8	Mid term week. Project Report due
Week 9	Project design: Hardware selection
Week 10	Project design: Cost estimation
Week 11	Design: Process Economic analysis
Week 12	Flowsheet preparation-1
Week 13	Flowsheet preparation-Final
Week 14	Presentation: Final Design Project
Week 15	Design project report due