

Membrane Science and Membrane Separation Processes - Course Syllabus

Course Number: CBE 336

Course Title: Membrane Science and Membrane Separation Processes

Academic Semester: Spring **Academic Year:** 2015/ 2016
Semester Start Date: Jan 24, 2016 **Semester End Date:** May 19, 2016

Class Schedule: Sunday/Wednesday 2:30-4 pm

Classroom Number:

Instructor(s) Name(s): Ingo Pinnau
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Office Location: Building 4, Room 4219
Office Hours: By appointment

COURSE DESCRIPTION FROM PROGRAM GUIDE

Formulation and solution of engineering problems involving design of membrane systems for gas separation, reverse osmosis, filtration, dialysis, pervaporation and gas absorption/stripping processes. Membrane selection, fabrication and preparation. Membrane transport: gas permeation and reverse osmosis. Polarization and fouling, membrane module design. Lectures and laboratory.

COMPREHENSIVE COURSE DESCRIPTION

Week 1 Introduction to Membrane Science

Week 2 Membrane Structures and Functionality

Week 3 Transport in Membranes

Week 4 Materials Science of Membranes

Week 5 Membrane Formation

Week 6 Membrane Modification

Week 7 Membrane Characterization

Week 8-9 Membrane Processes (MF, UF, NF, RO, Gas Separation)

Week 10 Modules and System Design

Week 11 Lab Demonstrations

Week 12 KAUST RO and Wastewater Plant Visit

Week 13-15 Project Presentations

GOALS AND OBJECTIVES

Students will learn advanced principles of state-of-the-art membrane science with specific emphasis on membrane applications, engineering, transport phenomena and materials.

REQUIRED KNOWLEDGE

Basic knowledge of transport phenomena, thermodynamics and materials science.

REFERENCE TEXTS

1. R.W. Baker, Membrane Technology and Applications, Wiley.
2. M. Mulder, Basic Principles of Membrane Technology, Kluwer Academic Publishers.
3. Y. Yampolskii, I. Pinnau, B.D. Freeman, Materials Science of Membranes for Gas and Vapor Separation, Wiley.
4. W.S. Ho, K.K. Sirkar, Membrane Handbook, Kluwer Academic Publishers.

METHOD OF EVALUATION

Graded content
<ol style="list-style-type: none">1. Midterm: April, 2016 (written test – closed book): 40%2. Final: May 2016 (individual projects – report and oral exam): 60% No make-up exams will be provided.

COURSE REQUIREMENTS

Assignments

CLASS MATERIALS, HANDOUTS, POSTING: Lecture notes will be posted on the blackboard.

COMMUNICATION INSTRUCTIONS: General communications will be posted on the blackboard. Individual communications will be carried out per e-mail. Mandatory reading material will be posted weekly on the blackboard.

Course Policies

In accordance with the University policy and professional standards, the highest levels of academic integrity are expected in this class. The code of student conduct is strictly enforced. Academic dishonesty will result in reductions in grades and/or expulsions from this class.

Additional Information

NOTE

The instructor reserves the right to make changes to this syllabus as necessary.