

Membrane Technology

Subject area: Chemical Engineering

University: DTU
Level: MA all years
Teaching mode: completely online, at specific time
Instructor(s): Manuel Pinelo

Short description

The purpose of the course is to enable the students to understand the mechanisms for solute transport in membranes and to estimate the possibilities to use separation processes based on the application of semipermeable membranes. The course is divided in 4 blocks: 1) Basics and models, 2) Traditional operation units (MF, UF, NF, RO), 3) Special unit operations, and 4) Industrial applications.

Full description

<https://kurser.dtu.dk/course/28434>

Learning outcomes

A student who has met the objectives of the course will be able to:

- Identify and describe the main unit operations associated with membrane technology
- Describe the main industrial applications of membrane technology.
- Derive equations for solvent and solute transport in pressure driven membrane processes.
- Calculate how concentration and eventually temperature polarisation influence the solute transport for the different membrane processes
- Describe the main polymeric materials used for membrane synthesis
- Describe the function of the main used membrane modules and how they are used in different membrane processes.
- Calculate mean flux, selectivity and membrane area for the different membrane processes.
- Describe process layout and eventually pre- and post treatment in relation to the fouling problems for the different membrane processes.
- Employ membrane technology knowledge to discuss recent journal articles in the membrane field and compare the with similar separation processes.
- Describe current applications of membrane technology, with particular emphasis on green processes and sustainability, by including several examples of processes in which membrane technology contributes to make processes greener e.g. use in downstream processing or use of membrane enzyme reactors

General information

Contact hours per week:	4
Total workload:	125 (app.), including lectures (in student hours for the whole course)
ECTS credits:	5
Language:	English
Course start date:	30 January 2023
Course end date:	08 May 2023
Add. info about start date:	
Weekly teaching day/time:	Mondays from 08.00 to 12.00
Time zone:	CET (Denmark, Germany, France, Netherlands, Switzerland, Czech Republic)
Further information:	The course has been taught online before and the students were very satisfied, as the evaluations were very positive. Even if online, there is a lot of variation and a lot of activities during the course. It is a perfect course for someone who does not have a background on membranes. Normally, after taking the course, if the student is interested, they usually ask for lab special courses on the topic or for a MSc defense.
Prerequisites:	As recommended pre-requisites, the students should have taken a previous courses covering mass balances and stoichiometric calculations. A previous course on unit operations is also fine.
Activities and methods:	Lectures, Group work, Self-study, Exercises, Tutorial sessions, Short videos, discussions are also included
Presence on campus:	No

Final examination

Form:	project
Date:	45056
Location/format:	Send project
Re-sit possibility:	yes
Transcript available:	end of semester
Add. info/requirements:	The final project consists of three different parts: 1) A set of problems that need to be solved, 2) a report about a particular topic that is given to the student, 3) Formulation of a process that the student has to create her/himself. The students get guidance about how to complete the different parts of the project during the lectures, and there is also assigned

time for Q&As. The report is individual and is submitted via email or similar platform

Registration

To register for this course, follow the registration requirements of your **home university** as specified here: www.euroteq.eu/courses-registration.

Administration

Number of places:	15
Minimum participants:	It is a very popular course, so there always quite a lot of students
Internal course code:	28434
Contact:	mp@kt.dtu.dk

This course is part of the EuroTeQ Engineering University joint course catalogue 2023. This is a collaborative activity of the partner universities DTU, L'X, TU/e, TalTech, CTU, TUM as well as Technion. Students from these universities can participate in the offered courses. It is the responsibility of the student to check if you fulfil the requirements to participate in a specific course. Students are also advised to check with their home institution how to get recognition of the ECTS credits gained in courses of the EuroTeQ course catalogue. For further information about EuroTeQ Engineering University, visit www.euroteq.eu or get in touch with the above-mentioned point of contact.