ChE-402

Diffusion and mass transfer

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Cursus	Sem.	Type
Ing.-chim.	MA1, MA3	Obl.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	Written
Workload	120h
Weeks	14
Hours	**3 weekly**
Courses	2 weekly
Exercises	1 weekly
Number of positions	

Summary

This course aims to provide an in-depth understanding of diffusion and mass transfer, an essential tool for the chemical engineers.

Content

1. Fundamentals of diffusion
2. Diffusion in dilute solutions
3. Diffusion in concentrated solutions
4. Diffusion coefficients in gases, liquids and solids
5. Diffusion in nanoporous materials
6. Multicomponent diffusion
7. Theories in mass transfer
8. Diffusion in chemical reactions
9. Modeling diffusion in membranes

Keywords

Diffusion, mass transfer coefficient, convection, multicomponent diffusion, mass transfer with reaction

Learning Prerequisites

Important concepts to start the course

Mass, and energy balance
Basics of diffusion and mass transfer

Learning Outcomes

By the end of the course, the student must be able to:

- Carry out calculations to extract concentration profile for a given system
- Carry out calculations to extract mass transfer rate for a given system
- Formalize mathematical models that describe complex mass transport cases.
- Apply various diffusion and mass transfer models to analyze and solve a wide-range of problems dealing with mass transport.

Teaching methods

1. Projector slides would be used to deliver the course content to the students in class.
2. Some exercise problems will be conducted during the lecture. The rest of the exercise problems will be conducted during the last hour of the class (exercise session).
3. Lecture notes of a specific class will be available on the moodle page (https://moodle.epfl.ch/course/view.php?id=9401) before the class.
4. Your smartphone would be used to conduct quizzes (usually multiple-choice questions). These quizzes are meant to support the learning process. For example, questions could be asked during the class to gauge understanding of the subject and review concepts. Your responses would be anonymous. Answers will not be used for formal assessment.
5. To participate in quizzes using smartphone, you can open the URL http://ttpoll.eu Then add che402 as the session id.

Expected student activities

Active participation in every class (solving exercise, in-class discussion, quizzes)

Assessment methods

Final exam

Supervision

Office hours	No
Assistant.e.s	Yes
Forum	Yes

Resources

Virtual desktop infrastructure (VDI)

No

Bibliography

Diffusion: mass transfer in fluid systems by Cussler

Ressources en bibliothèque

- Find the reference at the Library

Moodle Link

- https://go.epfl.ch/ChE-402