

ChE-402

Diffusion and mass transfer

Agrawal Kumar Varoon

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, that is an essential tool for the chemical engineers.

Content**Course 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. Dispersion
8. Theories in mass transfer
9. Diffusion in chemical reactions
10. Modeling diffusion in membranes

Keywords

Diffusion, mass transfer coefficient, convection, dispersion, 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

Projected slides for students in the classroom
Slides will be shared by zoom
Recorded lectures would also be available
Lecture notes will be available on course moodle page

Expected student activities

Active participation in every class (taking down lecture notes, solving exercise, in-class discussion, quizzes)

Assessment methods

Weekly homework (50%)
Final exam (50%)

Supervision

Office hours	Yes
Assistants	Yes
Forum	Yes

Resources

Virtual desktop infrastructure (VDI)

No

Bibliography

Diffusion: mass transfer in fluid systems by Cussler

Ressources en bibliothèque

- [Diffusion: mass transfer in fluid systems / Cussler](#)

Moodle Link

- <https://moodle.epfl.ch/course/reset.php?id=9401>