

ChE-302

Transport phenomena II

Sivula Kevin

Cursus	Sem.	Type
Biotechnology minor	E	Opt.
Chemical Engineering	BA6	Obl.
HES - CGC	E	Obl.

Language of teaching	English
Credits	3
Session	Summer
Semester	Spring
Exam	During the semester
Workload	90h
Weeks	14
Hours	4 weekly
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Summary

This course integrates intermediate fluid mechanics with heat and mass transport phenomena to enable students to analyze problems of interest to a chemical engineer. Students develop abilities to design basic transport modules for engineering application.

Content

- Turbulent flow
- The universal velocity profile (logarithmic law)
- Boundary layer theory
- Dimensional analysis and dimensionless groups
- Blasius and von Karman approaches
- Flows in porous media
- Blanke-Kozeney and Ergun equations
- Study of filtration
- Fluidization
- Heat transfer (unsteady state)
- Estimation of heat transfer coefficient without phase transition
- Heat exchangers

Learning Outcomes

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

- Estimate heat and mass transfer coefficients in chemical engineering situations
- Formulate solutions to complex transport problems
- Assess / Evaluate non-dimensional numbers and simplify situations
- Design transport modules (e.g. heat exchangers, fixed or fluidized beds)
- Apply boundary layer theory to transport situations
- Formalize velocity profiles in turbulent flow