ChE-302

# Transport phenomena II

Sivula Kevin

| Cursus | Sem. | Type |
|---|---|---|
| Biotechnology minor | E | Opt. |
| HES - CGC | E | Obl. |

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|---|---|
| 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 low)
- Boundary layer theory
- Dimentional analysis and dimentionless groups
- Blasius and von Karman approaches
- Flows in porous media
- Blanke-Kozeney and Ergun equations
- Study of filtration
- Fluidization
- Heat transfert (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