Summary

The course aims at introducing basic physical aspects of molecular and turbulent diffusion, as well as of dispersion processes, their mathematical modeling, solutions and related environmental applications.

Content

- Advection and diffusion
- Point source pollution
- Introduction to turbulence
- Turbulent dispersion
- Mixing in rivers, lakes and in reservoirs
- Atmospheric boundary layer
- Computational fluid dynamics

Keywords

Environmental diffusion, advection, dispersion, mixing, pollution, rivers, atmospheric boundary layer

Learning Prerequisites

Recommended courses
Basic knowledge of fluid mechanics

Learning Outcomes

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

• Interpret the physics of transport processes
• Elaborate linear models
• Solve linear models
• Develop numerical transport models with FLUENT
• Interpret and describe the physical processes relevant for environmental transport
• Elaborate and solve simple physical models for environmental transport
• Choose and apply appropriate computational fluid dynamics (CFD) approaches and models
• Develop numerical transport models with FLUENT: problem formulation, modeling, and interpretation of the results
• Describe and interpret the physical processes relevant for environmental transport
• Apply and choose appropriate computational fluid dynamics (CFD) approaches and models
• Solve and elaborate simple physical models for environmental transport
Transversal skills

- Use a work methodology appropriate to the task.
- Take feedback (critique) and respond in an appropriate manner.
- Write a scientific or technical report.

Teaching methods
Lectures, exercises and projects

Assessment methods
30 % continuous control during the semester (projet)
70 % written test during the exam session