ENG-420

Environmental transport phenomena

Crouzy Benoît, Porté-Agel Fernando

Cursus	Sem.	Type
Computational science and Engineering	MA1, MA3	Opt.
Computational science and engineering minor	H	Opt.
Energy Science and Technology	MA1, MA3	Opt.
Environmental Sciences and Engineering	MA1, MA3	Opt.
Mechanical engineering	MA1, MA3	Opt.

Language of teaching	English
Credits	5
Session	Winter
Semester	Fall
Exam	Written
Workload	150h
Weeks	14
Hours	**5 weekly**
Courses	2 weekly
Exercises	1 weekly
Project	2 weekly
Number of positions	

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 (project)
70 % written test during the exam session

Resources

Moodle Link

- https://go.epfl.ch/ENG-420