PEES7AD SIMULATION OF TRANSPORT PHENOMENA

PEES7AD	ECTS Credits : 2	Semester : S7
Simulation of transport phenomena	**Duration :** 21 hours	

Person(s) in charge :

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Keywords : Simulation of transport phenomena

Prerequisites : None

Objective : Provide a good understanding and mastery of numerical simulation

Today, mathematical modeling and numerical simulation are the preferred means for analyzing and decision-making in the energy and process sectors. This course is devoted to developing simulation models for transport phenomena according to the finite volume method. It ties in quite naturally with Transport Phenomena, since this numerical technique is dedicated to solving Partial Differential Equations, which are presented at the beginning of the 3rd semester.

Although the approach and the concepts are presented during the lectures, most of the work will be done using computers during tutorials, with a progressive development of a simulation program on a case study taken from the field of Environment, Energy and Processes.

Content:

• Presentation of course / Modeling approach - simulation

- General formulation of convecto-diffusive equations

- Basics of differentiation – Presentation of case study

• Simulation of diffusive transports in steady state

- Finite volume software architecture

- Basics in programming, editing and compilation

• Simulation of diffusive transports in steady state (continued)

- Algorithms for iterative numerical methods

• Simulation of diffusive transports in transient state

- Specifications for mini-project report

• Calculation of global balances

- Linearization of source terms

• Simulation of convecto-diffusive transports

- Simple and advanced discretization schemes

Abilities :

Levels	Description and operational verbs
Know	the numerical methods and algorithms used in the software
Understand	the finite volume method and the basics in programming, editing and compilation
Apply	simulation methods for diffusive transports in steady or transient state
Analyse	a problem coming from the field of Environment, Energy and Processes and establish an appropriate numerical model
Summarise	

Assess	
Evaluations :	

☑ Written test	☐ Continuous Control	☐ Oral report	☑ Project	☑ Written report