Mathematics and transport phenomena

ECTS
7 crédits

Hourly volume
109h

Introducing

Objectives

Objectives:
At the end of this module, the student will have understood and be able to explain (main concepts):

Mathematics:
The concept of series, the different types of convergence, the power series and Fourier series, the solution of the heat equation, the use of Matlab.

Transport phenomena:
- The basics of continuum mechanics
- The concept of balance and the different scales of application

The student will be able to:

Mathematics:
Study the convergence of numerical series or function series, solve a differential equation with power series, compute a Fourier series, solve the mono-dimensional heat equation.
Apply the mathematical knowledge via the development of simple Matlab programs allowing to illustrate these concepts in examples taken from physics, biology and chemistry.

Transport phenomena:
- Define a system and its contours, and calculate inlet, outlet and transformation fluxes
- Write local and macroscopic balances of mass, energy and momentum

- Solve analytically simple problems of Newtonian fluid mechanics

Necessary prerequisites

Necessary knowledge:

First year mathematics, first year computing.
Unit « Thermodynamics - Fundamentals and applications »
(# I1ANTH11) of the INSA first year curriculum or equivalent.

Practical info

Location(s)

Toulouse