Transport Phenomena

The objective of this course is to provide an overview of the basic notions, equations and modeling approaches related to transport phenomena. This includes the basic concepts of continuum mechanics, heat and mass transfer, rheology, fluid mechanics, and processes commonly found in chemical engineering. These equations, tools and concepts will be used frequently throughout the master.

1st semester - 32h - Assessment methods: Written exam.

Summary Part I - Fundamentals of thermodynamics

- Introduction - fundamental concepts
- First Law of thermodynamics - energy conservation, internal energy, heat, work.
- Second Law of thermodynamics - heat engines, entropy, Carnot cycle.
- Applications

Part II - Engineering Heat transfer

- Lectures on Heat Transfer
- Radiation
- Heat & Heat flux
- Conduction
- Transient conduction
- Convection

Part III - Continuum mechanics

- Basic properties associated with continuum mechanics - Tensor calculus, stress tensor
- Solid mechanics – Linear elasticity
- Fluid mechanics – Newtonian fluids, incompressible flows