Energy basics 3	Semester: S6

EU objectives

At the end of this course, students will be able to
- Explain the physical meaning of thermal conductivity and diffusivity, Biot, Fourier, Prandtl, Reynolds and Nusselt numbers;
- Analyse a simple unsteady thermal problem and transform it into a relevant mathematical model;
- Solve the unsteady conduction equation ;
- Calculate convective exchange coefficients for a given geometry and flow.
- Calculate temperatures and flows for simple heat exchanger models.
- Describe the thermodynamic behaviour of fluid systems
- Use tables and diagrams of thermodynamic properties
- Using a technical thermodynamics form

Description of the ECUEs

HEAT TRANSFER 2 :
Conduction equation in the unsteady state: Solutions for bodies assumed to be isothermal; Convection equations (forced and natural); Heat exchanger methods: NUT method and DTLM method; Practical work: demonstration of heat transfer by conduction/convection and thermal properties of materials (conductivity and diffusivity).

GENERAL THERMODYNAMICS 2 :
Application 1 - P, V, T systems: pure and mixed single-phase systems, pure multiphase and binary multiphase systems, heat exchange during chemical reactions, construction of the tools of technical thermodynamics ;
Application 2 - Fundamentals of technical thermodynamics: general balance equations (mass, total energy, entropy and exergy) in open and unsteady systems, permanent processes, methodical processes.

Prerequisites
Differential equations, integration, "Fundamentals of Energy 1" course

Bibliography
LIENHARD, John H. A heat transfer textbook. Courier Corporation, 2013. Thermodynamique : Fondements at applications, J.P. Pérez, Dunod, 2001.