

# Echanges Thermiques et Massiques



Component  
École Nationale  
Supérieure  
d'Électrotechnique  
d'Électronique

In brief

> **Code:** N7EM05A

## Presentation

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### Objectives

This course introduces the three main mechanisms of heat transfer (conduction, convection and radiation). The course focuses on basic methods to estimate heat flux and temperature magnitude in systems as well as industrial or natural. The program follows the book Fundamental of Heat and Mass Transfer, Bergman et al..

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### Description

1. Introduction : the three modes of heat transfer, energy balance, examples.
2. Heat conduction : steady-state conduction in 1 and 2 dimensions, transient conduction.
3. Convection : forced convection, external and internal flows, free convection, conservation equations, boundary layers and empirical method.
4. Radiation : radiation concept, black body, surface effects, radiation exchange between surfaces.
5. Experimental works : infrared thermography, heat conduction coefficient and thermal diffusivity measures.