#### **Heat Transfer**

1. Course number and name: 020TRCES2 Heat Transfer

2. Credits and contact hours: 6 ECTS credits, 3x1:15 contact hours per week

3. Name(s) of instructor(s) or course coordinator(s): Chantal Maatouk

4. Instructional Materials: PowerPoint slides; course handouts; lab experiments

### 5. Specific course information

### a. Catalog description:

The course seeks to cover the fundamental concepts and conduction, convection and heat transfer by radiation, as well as their application to the solution of thermal engineering problems. The course covers stationary thermal conduction and transient regime; flat surfaces; numerical simulations of conduction in one-dimensional and two-dimensional problems; external and internal forced convection applied to laminar and turbulent flows; natural convection; principles of the heat exchanger; and thermal radiation, form factors and radiation exchange between diffuse and gray surfaces.

- **b. Prerequisites:** 020ITCNI3 Introduction to Heat Transfer or Thermodynamics 2 (020TH2CI4).
- **c. Required** for ME students.

#### 6. Educational objectives for the course

# a. Specific outcomes of instruction:

After successful completion of this class, the students will be able to:

- 1) Understand the fundamentals of heat transfer processes occurring in natural and engineered systems and convey that understanding in course homework and exams.
- 2) Apply analytic procedures, numerical tools and problem-solving abilities to heat transfer problems such as those assigned in course homework and exams.
- 3) Understand and perform experimental measurement techniques for heat transfer measurements as illustrated by written laboratory reports describing methods and results.

#### b. PI addressed by the course:

PI	1.1	1.2	1.3	6.1	6.2	6.3	6.4	7.1	7.2
Covered	X	X	X	X	X	X	X	X	X
Assessed	X	X	X	X	X	X	X	X	X

## 7. Brief list of topics to be covered

- Introduction to heat transfer
- Heat conduction
  - **a.** One-dimensional conduction in steady state and without internal heat production
  - **b.** Steady-state one-dimensional conduction with internal heat production
  - **c.** Thermal transfers in fins
  - **d.** One-dimensional conduction in transient conditions
- Heat convection
  - a. General equations of convection
  - **b.** Laminar and turbulent flow
  - **c.** Catalog of correlations for convection
- Enthalpy transport
- Heat exchangers
- Radiative heat transfer