Heat Engines, Refrigerators and Heat Pumps

Level
BAC +4

ECTS
3 credits

Component
INSTITUT NATIONAL DES SCIENCES APPLIQUEES TOULOUSE

Number of hours
38h

Presentation

Description

With appropriate reminders and complements of thermodynamics, this course focuses on the behaviour of various industrial thermal systems :

- engines with continuous mass transfer (compressors, turbines...),

- condensable steam engines (steam-powered engines, refrigerating and heat pumps...), with the objective to optimize them, notably from an energetic efficiency point of view.

Organization:

- 8 lectures provide the necessary thermodynamic knowledge for modelling heat engines, refrigerators and heat pumps.

- 13 tutorial sessions deal with various problems. Students should prepare for these sessions in advance for maximum efficiency and personalization of interactions with the teacher. They have at their disposal a booklet gathering the problems and the tables and graphs necessary for their resolution.

- 3 lab work sessions devoted to the study of a compressor, a heat pump and an air handling unit complete the course.

Objectives

At the end of this course, the student should have understood and will be able to explain the operation of conventional heat engines, refrigerators and heat pumps as well as the basics of combustion.

The student should be able to size and optimize conventional heat engines, refrigerators and heat pumps.

Pre-requisites

Fundamentals in thermodynamics (1st year)

Thermodynamics and Thermodynamic Analysis (1st year)

Useful info

Place

Toulouse