Thermal engines and systems

ECTS
4 credits

Component
INSTITUT NATIONAL DES SCIENCES APPLIQUEES TOULOUSE

Number of hours
57h

Presentation

Description

Thermal engines : First, a reminder of the principles of thermodynamics, fluid modeling, thermodynamic transformations (isobar, isoenthalp, adiabatic, etc.). Secondly, analysis of the thermodynamic cycles of steam engines, gas turbines and heat pumps.

Thermal systems : Lumped parameter modeling of components involved in thermal engines and systems such as heat exchangers, compressors, turbines, valves. Case study on an air conditioning and pressurization system for an aircraft.

Computational fluid mechanics : Initiation to the CFD code Fluent. Numerical simulation of one of the components of a thermal system, in the framework of a project done by groups of 2 students.

Objectives

At the end of this module, the student should have understood and be able to analyze thermal and mechanical energy production systems and their associated components.

The student should be able to:

- Analyze the thermodynamic cycle associated with a power plant.
- Size a thermal engine to meet specifications in terms of requested power.
- Specify the components of a thermal engine or system.

- Calculate the air conditioning flow requirements to perform various functions (pressurization, fresh air renewal, heating, cooling) in an aircraft and adjust the recirculation and the flow distribution between the different cabin zones.

Pre-requisites

Basics of thermodynamics and heat transfer.

Useful info

Contacts

Education manager
ION HAZYUK
hazyuk@insa-toulouse.fr

Place

Toulouse