Optimization of energy processes and systems

Component
École Nationale Supérieure d'Électrotechnique d'Électronique

In brief

- **Ametys Code:** M4R9Y0J5
- **Open to exchange students:** Yes

Presentation

Objectives

Optimization issues are becoming increasingly important in energy systems. The aim of this course is to enable students to master the various optimization methods applied to the design and operation of these systems, with a particular focus on multi-objective approaches. Optimization criteria such as cost, energy efficiency, and environmental indicators are often contradictory, making decision-making particularly complex.

The course also introduces Multi-Criteria Decision Making (MCDM) tools, which enable the selection of a solution from a set of "optimal" solutions, thus providing a structured framework for solving the complex problems faced by energy systems.

Description

- Identification of multi-objective optimization problems: Examples of decisions and criteria in energy system optimization.

- Presentation of the main multi-objective optimization methods: Introduction to optimization and decision support approaches adapted to energy systems.

- Identification of relevant optimization strategies: Selection of appropriate approaches based on the specific characteristics of a given problem.

- Formulation of optimization criteria: Definition of technical, economic, and environmental criteria for the optimization of energy systems.

- Case study in a design office: Analysis of a gas turbine combined heat and power system, with problem formulation, multi-objective optimization, and decision-making based on technical, economic, and environmental criteria.