

PR4300 Cogeneration and Energy Production

Professor: Tanguy Poline

Language of instruction: English* – **Number of hours:** 36 – **ECTS:** 3

Prerequisites: General basic knowledge in physic (mechanics, thermodynamics,...)

Period: S8 Elective 10 February to June IN28IE3, SEP8IE3

Course Objectives

1/ Acquire general knowledge on energy production and consumption.

2/ Cogeneration/electricity plant:

- ◇ develop a project analysis (equipment, design, economic profitability)
- ◇ gain experience in operations (troubleshooting, control philosophy, environment)

3/ Be able, on a wide variety of energy related subjects (resources, technologies, processes, equipments, consumers), to perform a quick qualitative and numerical analysis.

On completion of the course, students should be able to

- ◇ Gain interdisciplinary knowledge in energy, and especially in cogeneration
- ◇ Quantify and perform a rough check of energy data in interdisciplinary areas

Course Contents

Cogeneration:

- ◇ Cogeneration principles, energy resources, specific costs.
- ◇ Basic cogeneration components: steam turbine, gas turbine, boiler, engine. Comparison.
- ◇ Heat recovery steam generator design. Technical details on the gas turbine.
- ◇ Plant operation: control philosophy, troubleshooting, costs, water management, environmental constraints.

Energy production and consumption:

- ◇ Presentation of main energy process lines with CO₂ (coal, liquid fuel, natural gas, bituminous).
- ◇ Partial presentation of main energy process lines without CO₂ (nuclear, hydraulic, wind, solar, bio, geothermal).
- ◇ Electricity and gas market.
- ◇ Sustainable development: classification of energy savings (electricity, industry, housing, transport).

Course Organization

Tutorials: 33 hr, Exam: 3 hr

Teaching Material and Textbooks

Handout associated pdf

Evaluation

Final exam (MCQ + written exam): 2h30