
PR4300 Cogeneration and Energy Production

Professor : Tanguy POLINE

Language of instruction : ANGLAIS – **Number of hours** : 36 – **ECTS** : 3,0 - **Quota** : 35

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

Period : S8 elective 10 between february and june

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.
- Potential visit in Rotterdam of industrial plants over one full day

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: 30 hr + one day visit + exam

Bibliography / Teaching Material and Textbooks

Handout & electronic associated pdf

Evaluation

1/3: oral presentation

2/3: final exam (MCQ + exercices) over 2h30.