Second Cycle

Year 4

I4.8 Nantes
ENERGY AND AUTOMATED PROCESSES

Targeted professions

Industrial Process / Energetic Process engineer / Maintenance engineer / Energy Efficiency engineer (Research department, Calculation, buildings, environmental engineering).

Topic : Energy & Automated Processes

Competencies to be acquired :

In the framework of the sizing of a servo-control energy system, the student must be able to :

Process and control	• Use acquisition/control software: Labview. • Explain and interpret a functioning and a malfunction of an existing control loop. • Control a process, create a control loop, programme a PID. • Control a motor / electric resistance … • List the components of an energy facility.
Energetics tools : digital simulation	• Use a CFD 3D calculation code: StarCCM. • Use 1D thermo-fluid software: Flowmaster for the networks (pressure loss, saturation pressure, etc.). • Conduct calculations / modelling with a critical mind. • Analyse the result. • Modify the software parameters to obtain a quantitative result.
Energetics tools : experimental measurements	• Measure a physical magnitude: choose the instrumentation and the acquisition (sensor, measuring chain, digital and analogue data-processing). • Analyse a measurement (temperature, pressure, humidity, current, voltage…). • List the safety tools in the business.

Organisation

The majority of the documents are in English. Some lectures/tutorials and practical exercises are in English.

Lectures / Tutorials	• Computational Fluid Dynamic (CFD) • Turbulence (modelling) • Finite volume method • Resolution strategy & algorithms • Pressure loss in dense networks • Metrology • Acoustics
Practical Exercises	CFD : 5 Ex of 2 hrs each + 2 hrs of assessment. Discovery Tutorial, Geometry, Data structure, Heat transfer, Simulation of a cylinder. *Practical Assessment :* Ex 1 : Signal acquisition & Fourier transform (spectral aliasing and Shannon criteria). Ex 2 : House No.1, model instrumentation. Ex 3: House No. 2, open-loop and closed-loop control. Ex 4: Flowmaster, network balancing.
Assessment methods	Two 2 hrs DS 2 hrs practical assessment for CFD Exercise Report

Project	24 hrs scheduled in the timetable. About 90 hrs of independent work by student. Groups of 4 to 6 students. Subject suggested by a business. Assessment : report and oral viva.
Practical exercise	Application of Thermal Regulations
Extended Energy & Automated Processes Topic	Lectures/ Tutorials Energy Audit Thermal Regulations (TR 2005) – Insula France Environmental Management Sizing system project (Hvac, heating…) Assessments: 2 hes DS/MCQ