INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

SEMESTER 7_4th YEAR AE

Practical info

Location(s)

Toulouse

Architectures or technological systems

ECTS
7 crédits

Hourly volume
93h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

Power transmissions
-Needs for power, associated functions, power architectures in technological systems (mechanic, hydraulic, electric)
-The interest of system modeling, methods and tools,

Computer science & Electronics
- the interest to have a common modeling graphical language, the concepts relative to a object oriented approach.
- Industrial network introduction, interface eelctronics

The student will be able to:
Power transmissions
- identify and structure the power needs (supply, meter, distribute, transform, condition, manage, etc)
- analyse a schematic of a power system (mechanical, hydraulic, electric) at an architectural and functional level
- assess/list/compare solutions for implementing a given function of power transmission
- synthesize a power architecture (mechanical, electrical, electric) from functional needs

Computer science & Electronics
- how to choose the most appropriate diagrams depending on the approach: structure, behaviour, interaction
- Propose an object-oriented UML model of a system
- Implement a technological solution on a mechatronic system

Necessary prerequisites

Basic technological knowledge in mechanics, hydraulics, electrics

Practical info

Location(s)

Toulouse

Multiphysics modeling

ECTS
6 crédits

Hourly volume

Location(s)

Toulouse

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):
- Lumped (0D/1D) and distributed (3D) parameters models for Multiphysic systems.
- Network approach for lumped parameters models, Acausal/causal concepts, bond graph, Finite Element Methods.

The student will be able to:
- Set up 0D/1D (electrical, mechanical, hydraulical, thermal) and 3D models (mechanical) for mechatronics systems.
- Use 0D/1D platforms such as : Dymola/Modeilca, AMESim, Simulink.
- Use 3D platforms such as : Patran/Nastran or Abaqus

Necessary prerequisites

Kirchhoff laws, electrocinetic, work/energy/power, pressure and hydrostatic, conduction/convection, heat transfer.
Strength of material for BSME.

Practical info

Modelling tools and Optimization

ECTS
5 crédits

Hourly volume

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

- Various approaches to analyze and evaluate the performances of discrete event system DES,
- Various types of modelling adapted to the problems considered (deterministic or stochastic models , numerical and combinatorics optimization models, models of concurrency)
- Algorithms available to solve these problems.

The student will be able to:

Model and solve operational research problems (optimisation, linear programming, graphs, stochastic process) and discrete-event systems problems.

Model stochastic systems, such as a network of queues , using Markov chains. Compute their stationary performance measures, and dimension their capacity.

Model a DES by Petri net, analyse the properties of the Petri net by various methods of analysis (exhaustive and structural)

Necessary prerequisites

Linear Algebra, Differential Calculus, Probabilities, Dynamic systems, Basic concepts in propositional logics and in Petri Nets.

Practical info

Location(s)

Toulouse

Automatic control

ECTS
4 crédits

Hourly volume

Introducing

Objectives

For GM students, this course is a practical extension of the continuous marking methods seen in the previous year.
Optional part for AE: Understand the basic principles and constraints of hardware in the loop (HIL) simulations.

All students follow the end of the UF which deals with numerical control techniques and methods.

The student will be expected to be able to:
- Model a discrete system or discretize a continuous system.
- Give the performance of a discrete system.
- Synthesize a discrete control following a specification (performance) and implement it.

Necessary prerequisites

- AE-SE :
Feedback systems (I2MAAU11)
Control and computer architecture (I3MAAU11)
Control of Linear Time Invariant Systems (I3MAAU21)

- GM-IS :
Dynamic Systems (I3ICDM11)

Practical info

Location(s)

Toulouse

Improving one's autonomy and building one's own professional project level 2 S7

ECTS
4 crédits

Hourly volume
46h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

Physical and Sports Activities
The student will be able to:
to list the problems to be solved:
¿ Know the Physical and Sports Activity (rules, meaning, roles, etc.),
¿ Design the objective of the project.
to organize:
¿ Know the constraints, the resources, and the means available,
¿ Know how to choose and plan actions over time,
¿ Know how to get involved in the group and the project: know how to adapt, dare to stimulate action, know how to give up, propose, etc.
to regulate:
¿ Know how to observe,
¿ Know how to carry out a balance sheet,
¿ Know how to readjust the choices if necessary.

Individualized Professional Project
The student should be able to:
¿ Develop your professional vision and define a strategy.
¿ Customize, present and compare your project to professionals
¿ Enrich your professional network
¿ Set development axes, objectives and action plans

Necessary prerequisites

Learning outcomes 1st, 2nd, 3rd year.

Practical info

Location(s)

Toulouse

Improve your management abilities

ECTS
4 crédits

Hourly volume
45h

Management I3CCGE51

Introducing

Objectives

At the end of this module, the student will

¿ Know the legal environment and responsibilities of a business
activity
¿ Be able to objectively assess the financial health of a company and evaluate the rentability of an investment
¿ Realize a market diagnosis (benchmarking) and a business diagnosis in order to make decisions and set goals and strategies
¿ Collect the market data and put in action a business plan adapted to the means and goals of the company
Module L 2
The objectives, defined in reference to the CEFRL for the 5 language activities, are specific for the language studied Chinese, German, Spanish ¿ and the level of the student.

They can be consulted on :

https://moodle.insa-toulouse.fr/course/view.php?id=44

In certain cases, students may be authorised to follow an English module instead of another language

Necessary prerequisites

Practical info

Location(s)

Toulouse

INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

Toulouse School of Management

Practical info

Location(s)

Toulouse

Political sciences semester 1

ECTS
3 crédits

Hourly volume

Practical info

Location(s)

Toulouse

Device modeling and digital circuits architectures (reconfigurable computing)

ECTS
5 crédits

Hourly volume
55h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

-the electronic device and digital electronic systems modelling
-the issue of the integration of electronic circuits
-the design and performance optimisation of digital architectures especially in frequency and power consumption. Ultra low power architectures will be studied for sustainable development.
- the technologies for green computing
- reconfigurable computing using FPGAs
-digital architectures dedicated to embedded Artificial Intelligence (AI)

The student will be able to understand the models of main electronics active devices and digital complex architectures and their optimisation for sustainable development The student will be prepared for the future technological breakout in their professional life.

Necessary prerequisites

Electrical circuits, electrostatics, analog and digital electronics, computer engineering

Practical info

Location(s)

Toulouse

Analog electronic system architecture

ECTS
4 crédits

Hourly volume
54h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):
- Dimension and design of analog electronic functions of information processing (filtering,
amplification, automatic gain control, voltage controlled oscillators, modulators / demodulators AM and FM;
-Optimize the signal to noise ratio in each subset of an embedded system
-Modeling architectures for robust usage constraints (consumption, temperature to dissipate), the
thermal variations of the environment and dispersions characteristics of components

Practical info

Location(s)

Toulouse

[FRANCAIS] Analyse des systèmes complexes

ECTS
4 crédits

Hourly volume
50h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

- Principles, difficulties and limits of the modelling of systems with multiple inputs and multiple outputs.
- Design and implementation of control of systems with multiple inputs and multiple outputs.
- Main possible and observable behaviors which can occur in the nonlinear systems (equilibrium states, limit cycles, complex behaviors) and their evolution by variation of the parameters.
- Basis of the theory of Lyapunov

The student will be able to:
- To apprehend the implementation of the control of a process with multiple inputs and multiple outputs.
- To begin the analysis of a nonlinear system by various techniques (qualitative, geometrical, and simulations)
- To lean on numerical analysis (Matlab©) to establish, confirm, validate, simulate and implement the theoretical results discussed during the courses.

Necessary prerequisites

- Cours de 2e année « Systèmes bouclés » (I2MAAU11)
- Cours 3e année IMACS « Modélisation et analyse des systèmes linéaires » (I3AMAU11)
- Cours 3e année IMACS « Commande des systèmes » (I3AMAU12

Practical info

Location(s)

Toulouse

Digital signal acquisition architectures and Computed controlled systems

ECTS
4 crédits

Hourly volume
60h

Introducing

Objectives

At the end of this module, the student will have understood
and be able to explain (main concepts):

The complete modelling from sensor to actuator is presented, associated with digital control technics. A specific labwork deal with the implementation of a complete chain of acquisition and digital processing in order to carry out the control of an actuator.

Practical info

Location(s)

Toulouse

[FRANCAIS] Informatique matérielle

ECTS
3 crédits

Hourly volume

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain:
- Programming specificities of the peripheral units for microcontroller.
- The different peripherals of a microcontroller and their behaviour.
- How to take into account hardware constraints for the design of embedded system.

The student will be able to:
- To select an architecture processor adapted to the software application and to the process configuration.
- To conceive and test the techniques of the programming by hardware interruption.
- To use debug tools o and test in the context of cross-development.
- To find information into datasheet

Practical info

Location(s)

Toulouse

INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

QSE APS 4A GEI – 1

ECTS
4 crédits

Hourly volume
67h

Practical info

Location(s)

Toulouse

Improve your management abilities

ECTS
4 crédits

Hourly volume
45h

Management I3CCGE51

Introducing

Objectives

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Necessary prerequisites

Practical info

Location(s)

Toulouse

INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

Toulouse School of Management

Practical info

Location(s)

Toulouse

Machine Learning

ECTS
2 crédits

Hourly volume

Practical info

Location(s)

Toulouse

Political sciences semester 1

ECTS
3 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
1 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
2 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
3 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
4 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
5 crédits

Hourly volume

Practical info

Location(s)

Toulouse

French I

ECTS
3 crédits

Hourly volume

Practical info

Location(s)

Toulouse