# SEMESTER 9_5th YEAR AE_THEME ESPE

# Introducing

## Description

## Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

# Practical info

## Location(s)

Toulouse

# [FRANCAIS] Architecture électronique pour l'énergie

ECTS
5 crédits

Hourly volume
66h

# Introducing

## Description

## Objectives

General objectives: the goal of this UF is to know how to determine, size and produce the electronic architecture of an on-board system, select the components, under energy constraints: constraint of battery, autonomy, availability of power sources. energy¿ The UF therefore addresses
questions of the architecture of electrical energy converters, the installation of charging and battery
management systems, and architecture with multiple energy sources (advertising energy). The measurement of physical quantities (current, voltage, temperature, etc.) is
essential in an energy conversion or control chain for an electromechanical actuator. The UF also deals with the various sensor technologies and associated Electronic Instrumentation and Measurements.

At the end of this module the student will be able to:

- Design an electronic architecture of an embedded system under energy constraints
- Select appropriate electronic components for energy converter system
- Choose electrical energy storage solutions according to the associated constraints
- (Battery Management System / cell balancing
- Implement an ambient energy harvesting solution to design embedded systems energy self-sufficient
- Create a co-design HW / SW

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# Practical info

## Location(s)

Toulouse


Non-contractual information

# Embedded software and command for energy

ECTS
4 crédits

Hourly volume
48h

# Introducing

## Description

## Objectives

Objectives:
The electrical efficiency of electronic systems can be drastically improved by an appropriate selection of controls and algorithms whose objectives are to reduce as much as possible the activation of available resources of programable devices. The modeling of processing energy systems is central to evaluate their stability properties but also their dynamic performances which are key properties for the design of adequate control laws. One of the main difficulties is due to the nonlinear behavior and the commuting nature of all the processing energy systems which impose an important adaption of the control design methods. In this UF, control law design methods considering efficiency constraints are presented for static power electronics converters and for electrical motors. Some algorithmic aspects for the low energy programming associated to a wireless system are also developed.

Expected Competences:
- Modeling of static power electronic converters (Linearization around an equilibrium state, Nonlinear model, Switched model)
- Design and implementation of a control law for a static converter (linear and nonlinear control)
- Development of an embedded software reducing the energy consumption of the programable platform

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# Practical info

## Location(s)

Toulouse

# Technology, fabrication and industrialization of embedded systems

ECTS
5 crédits

Hourly volume
66h

# Introducing

## Description

## Objectives

General objectives: this UF addresses the integration, characterization and certification aspects of electronic systems. The students approach the various technologies of manufacturing and assembly of electronic systems, by addressing the tools of specification and industrial design (Electronic Computer-Aided Design). In addition, aspects of design methods and standards / conformities for the
economical marketing of an electronic product are addressed. As the power components are subject to strong voltage and thermal constraints, issues of reliability and robustness are also addressed. Finally, the characterization aspects of various energy-related performance in electronic systems are dealt with impedance adaptation for optimal transfer of power to an antenna, EMC and ESD characterization, measurement of energy consumption.

This UF is deliberately based on an industrial approach and is carried out around the design of an electronic card prototype in an industrial workshop and then its characterization.

- Integrate an electronic system
- Design an e-card, under integration, energy, EMC, thermal constraints, etc.
- Reliability and robustness of the new power components
- Measure the performance of an electronic system (energy consumption, efficiency, CEM, impedance matching)
- Specify and carry out the certification process of an electronic system

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# Practical info

## Location(s)

Toulouse

# Electronic design for electrical vehicle

ECTS
5 crédits

Hourly volume
55h

# Introducing

## Description

## Objectives

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

- Advanced commands and actuators for electric vehicle powertrain
- Aechnologies and devices for electric vehicles
- Aevelop field oriented control for synchronous motor control
- Aropose and dimension electronic architecture for electromechanical actuator chains
- Analyze the failure modes of a motor driver and propose diagnosis and solutions to ensure safety

The student will be able to:
- Design and realize the command of electromechanical actuator (field oriented control for synchronous motor command).
- Design electronic architecture and embedded software for safe powertrain application, realized with real devices dedicated for automotive applications (microcontroller, smart power devices, sensors, system basis chip)

## Évaluation

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# Practical info

## Location(s)

Toulouse

# Interdisciplinary project: smart energy manager for solar panel system

ECTS
5 crédits

Hourly volume
68h

# Introducing

## Description

## Objectives

The aim of the module is to mobilize all the skills in electronics, automatic control systems and embedded programming acquired during years 2,3,4,5 for an ambitious and complex engineering or R&D project. The students will be work with a huge autonomy. During this module, the students will work on an engineering project proposed by a industrial partner with the following steps:
¿ Team work (organization, communication planning)
¿ Project based on partner specification
¿ Research and analysis of solutions, positioning of the solution to the state-of-the-art
¿ Design, assembling, test of the proposed solutions
¿ Meeting points with the customer
¿ Planning and hardware supply management
¿ Reports and deliverables

## Necessary prerequisites

I4AESE51 ¿ Energy management for embedded systems
I4AEAU11 ¿ Data acquisition and digital command
I4AEIM11 -Microcontroller programmation
I4AESE31 - Analog architectures for embedded systems
I5AEEE11 - Electronic architectures for energy
I5AELA11-Automation and embedded software for energy

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# Practical info

## Location(s)

Toulouse

# Human relations

ECTS
6 crédits

Hourly volume
78h

# Introducing

## Description

## Objectives

L'étudiant devra être capable de :
-Analyser des situations de groupe avec des concepts issus de la psychologie sociale
-Identifier les dimensions éthiques de ces situations et prendre position
-Repérer et comprendre des informations liées aux RH
-Analyser une situation de management d¿équipe en référence à un cadre théorique
-Formuler et argumenter des solutions managériales
-Agir dans un milieu naturel : analyser, décider, agir ; mettre en œuvre la sécurité, utiliser du matériel spécifique. découvrir un site.
-Respecter et s'intégrer dans un environnement différent de ses habitudes
-S'engager avec cohérence dans le projet d'activités
-Prendre part activement au collectif
-Valider son projet professionnel et construire une stratégie pour trouver un emploi

## Necessary prerequisites

None

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# Practical info

## Location(s)

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Non-contractual information