



Lieu de la formation
ANGERS - Campus de Belle-Beille

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INSTITUTE OF TECHNOLOGY - IUT

ELECTRONICS AND MICROCONTROLLERS PROGRAMMING FOR EMBEDDED SYSTEMS

The department of electrical engineering and computer science offers a fully English-taught international semester based on embedded electronic systems. The course program consists of 2 compulsory units (embedded electronic systems and a lab-work project) and 8 cross-disciplinary, scientific or technical electives accounting to 42 ECTS. A final project allows the students to implement the knowledge and skills acquired during the semester. The students will integrate a first-year or second-year group (or both) according to the units they choose.

French Culture and institutions, 3 ECTS

French Language 3 ECTS

Applied Statistics 3 ECTS

Embedded Electronic System
(Semester 2)
9 ECTS

Physics
(Semester 2)
3 ECTS

Mathematics
(Semester 4)
3 ECTS

Linux Programming
(Semester 4)
3 ECTS

WEB Programming
(Semester 4)
3 ECTS

Final Labwork Project
(April to June)
9 ECTS

Project Management 3 ECTS

Embedded Electronic Systems (compulsory) 9 ECTS

Objectives :

Development of small embedded systems (limited to moderately complex cases)

- Model a system within its environment
- Perform software development through its different stages (analysis, algorithm, coding, testing)
- Integrate hardware and software together
- Understand the architecture of a microcontroller system
- Master the use of the peripherals of a microcontroller
- Understand the mechanisms of interruption

Content :

Approach for developing an embedded computer application:

- Understand the hardware architecture of the target
- Understand the management functions of typical devices (digital inputs / outputs, analog digital and digital analog converters, timer, serial communication, PWM ...)
- Analysis of the specification, identification of the material resources required and the mechanisms for their implementation (scan or interruption)
- Model the embedded application
- Code in an advanced language
- Use a predefined validation method
- Use a debugging tool (debugger type)
- Use the language of material description of circuits
- Documentation of the source files



INSTITUT UNIVERSITAIRE
DE TECHNOLOGIE



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Impression : Service reprographie UA

4 Bd Lavoisier
BP 4218
49016 ANGERS Cedex 01



Lab Project – (compulsory) 9 ECTS

2 POSSIBILITIES :

A . Project in electronics :

- completing a functional analysis of the Audio Amplifier
- analysing the preamplifier frequency behaviour through a SPICE simulation (Bode diagram)
- designing a PCB (Printed Components Board) and computing values of components, most of the components have to be SMC technology
- organising and achieving structural and functional tests of the two boards
- programming the microcontroller ATMEGA32: this microcontroller makes the link between the IHM and the different subsystems of the audio amplifier

B. Project topic chosen by the student and the IUT project supervisor :

- Topic chosen within the scope of our supervisors' research areas and the student's interests
- 8 to 10 weeks

Electives

● French culture and institutions 3 ECTS

● French Language 3 ECTS

● Applied statistics 3 ECTS

- apply basic knowledge of statistics to understand certain problems in the fields of science, management, industry and daily life

● Project management - 3 ECTS

- learn the methodology of project management
- determine the stakes of the projet, its objectives, its feasibility and risks
- define the team, the contract, the schedule
- follow up the technical realisation, the budget, management of differences ...

● Physics 3 ECTS

- Knowledge of the electric and magnetic field for the basic components (capacitor and coil)
- ability to qualitatively draw lines of the electric field (positive charges towards negative charges) and the magnetic field (corkscrew rule)
- Knowledge of the induction phenomenon
- Knowledge and use of the appropriate units of vocabulary for measurements adapted to sensors
- Knowledge of some typical electronic systems and their respective interests used to interface sensors

● Mathematics : linear algebra and applications 3 ECTS

- Vector spaces
- linear applications
- matrix calculus
- representation of a linear application by a matrix
- Matrix diagonalization

● WEB Programming 3 ECTS

- Web fundamentals (Internet, http, server and web client)
- Overview of the current web technologies
- Highlight on the interlacing between the technologies studied
- Structured around basic and relevant examples from the industry
- Programming languages: HTML, CSS, PHP, and JavaScript
- Design and development of a hosted dynamic web application

● LINUX Programming 3 ECTS

- Linux graphical environment
- architecture system
- different Linux distributions and free softwares
- constituents (or characteristics) of the system and their configuration
- shell programming
- C programming in Linux