ELECTRICAL ENGINEERING & COMPUTER SCIENCE (GEII)

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.

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<td>French Language, 3 ECTS</td>
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<td>Applied Statistics, 3 ECTS</td>
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<td><strong>Embedded Electronic System (Semester 2)</strong></td>
<td>9 ECTS</td>
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<td>Physics (Semester 2), 3 ECTS</td>
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<td>Final Labwork Project, 9 ECTS (April to June)</td>
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1- **Embedded Electronic System** (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.

2- **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
3- 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 - 3ECTS
  - 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)
  - be able 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

CONTACTS

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