Electronics & IoT

TAUGHT IN FRENCH/ENGLISH

Angers

/ AIMS

The IoT major aims at training ESEO engineers capable of designing, developing, integrating and implementing low-power connected electronic solutions. It will also enable them to understand how these systems interact with the surrounding IT environment such as networks and mobile applications. The large number of projects that ESEO offers leaves ample room for creativity.

/ ACQUIRED SKILLS

You will acquire skills in microcontroller-based and FPGA-based hardware development, in low-level embedded software development, in RF communication and RFID. You will also enhance your skills in selecting and implementing embedded communication protocols and understanding issues related to energy efficiency, security and mechanical integration. According to your taste, you will be offered to develop a basic mobile application and bind it to your product, to deepen your knowledge of embedded Linux or to specialise in Systems-on-Chip (SoC) and microelectronics.

/ CAREER OPPORTUNITIES

The targeted sectors for electronics and IoT students include not only IoT, but also professional and consumer electronics, automotive and aerospace. The wide range of acquired skills is also a significant asset for business creation.

COURSE UNITS

/ SEMESTER 8

- **IoT Project:** 56 hrs – 5 ECTS
- **Microwave Circuits:** 28 hrs – 2.5 ECTS
- **Radio-Frequency Identification (RFID):** 53 hrs – 5 ECTS
- **Digital Circuit Design (VHDL, Verilog):** 28 hrs – 2.5 ECTS
- **Electromagnetic Compatibility (EMC):** 28 hrs - 2.5 ECTS
- **Advanced C Language Programming:** 28 hrs – 2.5 ECTS
- **English:** 28 hrs – 2.5 ECTS
- **Transversal Skills:** 28 hrs – 2.5 ECTS

+ 1 block (2 Course Units)

- **Networks:** 28 hrs – 2.5 ECTS
- **Multitask Programming:** 28 hrs – 2.5 ECTS

or : ■ **Analogue CMOS Design:** 56 hrs – 5 ECTS

/ SEMESTER 9

- **Final Year Project:** 168 hrs - 14 ECTS
- **Antennas and Software Radio:** 28 hrs - 2 ECTS
- **Batteries and Energy Harvesting:** 28 hrs - 2 ECTS
- **Systems-on-Chip (SoC) - Digital Design:** 28 hrs - 2 ECTS

+ 1 Course Unit determined by the block chosen in semester 8:

- **Embedded Linux:** 28 hrs - 2 ECTS.
- **Systems-on-Chip (SoC) - Analogue Design:** 28 hrs - 2 ECTS

+ 4 selected Course Units*:

112 hrs - 8 ECTS
(each Course Unit = 28 hrs - 2 ECTS)

*** To be chosen from the elective course units listed**

Elective Course Units

Elective course units should be chosen from the list below. Only one course unit can be chosen per numbered sub-table.

COURSES	PROVIDED BY
ELECTIVE COURSE UNIT 1	
Wireless Communication	Electronics & IoT
Protocols for the IoT	Electronics & IoT
Green IT	Software & Data
OS for Embedded Systems	Embedded Systems
Cryptography	Cloud, System & Security
ELECTIVE COURSE UNIT 2	
Architecture of Data Center	Cloud, System & Security
Antennas and Software-defined Radio (SDR) 4*	Electronics & IoT
Android Project	Software & Data
Model-driven Engineering (MDE)	Embedded Systems / Software & Data
ELECTIVE COURSE UNIT 3	
Efficient & Safe Programming	Embedded Systems
Information Systems & Business Strategy 1*	Software & Data
Offensive Security	Cloud, System & Security
Monolithic Microwave Integrated Circuits (MMIC)	Electronics & IoT
Artificial Intelligence 1*	Software & Data
Linux Platforms	Electronics & IoT/ Embedded Systems
Embedded Security for the IoT	Electronics & IoT
ELECTIVE COURSE UNIT 4	
Docker Infrastructure	Cloud, System & Security
Real-time Programming	Embedded Systems
Batteries and Energy Harvesting 4*	Electronics & IoT
Client-side Web Development using REACT	Software & Data
ELECTIVE COURSE UNIT 5	
Machine Learning for Embedded Systems	Embedded Systems
Exploration of a LoRa Tracking IoT Navigation System	Electronics & IoT
Creativity & Innovation	Software & Data
Network Security	Cloud, System & Security
Android Software	Electronics & IoT / Embedded Systems
VMWare Infrastructure (VCenter)	Cloud, System & Security

COURSES	PROVIDED BY
ELECTIVE COURSE UNIT 6	
Formal Modelling	Embedded Systems
Embedded Linux 5*	Electronics & IoT / Embedded Systems
Infrastructure Monitoring	Cloud, System & Security
Web Technologies and Continuous Integration	Software & Data
Engineering of Communication Systems	Electronics & IoT
ELECTIVE COURSE UNIT 7	
Information Systems and Business Strategy 2*	Software & Data
Infrastructure Design & Security	Cloud, System & Security
Artificial Intelligence 2*	Software & Data
Advanced Testing	Embedded Systems
Rapid Prototyping	Embedded Systems
Advanced Processor-based Architectures	Electronics & IoT
Multiphysics Systems	Electronics & IoT
ELECTIVE COURSE UNIT 8	
Advanced Databases & NoSQL	Software & Data
Communications in Embedded systems	Embedded Systems
Systems-on-Chip (SoC) Digital Design 4*	Electronics & IoT
Security for Embedded Systems	Software & Data
.NET Platform	Software & Data
Cloud Orchestration: Openstack	Cloud, System & Security
ELECTIVE COURSE UNIT 9	
Information Systems and Business Strategy 3*	Software & Data
Applied Cryptography for Developers (AC4D)	Software & Data
Systems-on-Chip (SoC) Analogue Design 5*	Electronics & IoT
Artificial Intelligence 3*	Software & Data
Security Audit	Cloud, System & Security
Operational Security	Embedded Systems

1 - 2* - 3* Students choosing «Information Systems & Business Strategy» and «Artificial Intelligence» should take **all 3 course units** in tables 3, 7 and 9*

4 Compulsory Course Units for Electronics & IoT students*

5 One of these two Course Units is compulsory for Electronics & IoT students, depending on the block chosen in semester 8*