MASTER ELECTRONICS, ELECTRICAL ENERGY AND AUTOMATION

MICROTECHNOLOGY FOR COMMUNICATION SYSTEMS AND SENSORS

ENTRY REQUIREMENTS

For M1, a high school diploma plus 3 years of higher education in science. For M2, a high school diploma plus 4 years of higher education in science. Recruitment by application.

ACQUIRED SKILLS

The course is designed to train students in the field of advanced electronic systems, such as telecommunications systems and those with embedded advanced miniaturised sensors (automobile, aviation, aerospace and medical instrument industries, etc.). The main focus will be on the important aspects of technology, design methods, device simulation, quality and reliability studies and product industrialisation. ACQUIRED KNOWLEDGE AND SKILLS:

- Theoretical knowledge: material physics for microtechnology, physics of components, communications systems and microwave devices.
- Methodological knowledge: analogue and digital circuit design, electromagnetic compatibility in circuits and systems.
- Practical knowledge: cleanroom technology, microwave measurements, modelling (mechanical, microwave or component), software for circuit design, programming.

YOUR FUTURE CAREER

After this course, graduates can become design engineers, research engineers, company project leaders, researchers or teacher-researchers. The course leads into the following business sectors:

- Telecommunications: development of communication devices, monitoring of connection quality
- Sectors requiring circuits and advanced miniaturised sensors (automobile, aviation, aerospace and medical instrument industries, etc.)
- Industry which does not specialise in electronics but where sensors need to be used (quality control, tests). Also, depending on the type of internship undertaken, it is possible to move into research. Graduates can find jobs in research and development, public or private, and teaching and research in universities and schools.

BENEFITS OF THE PROGRAM

The course is supported by the excellent skills of the ESYCOM laboratory in the subjects taught. Part of the curriculum is taught in English, thereby preparing students for entry into the industrial sector or the research sector.
STUDY PROGRAM

YEAR 1, SEMESTER 1.

Unit 1 - Mathematics and Signal Processing (ECTS: 9) - Mathematics - Signal processing
Unit 2 - Physics (ECTS: 10) - Electromagnetism and antennas - Measurements and sensors
Unit 3 - Electronics (ECTS: 12) - Analogue electronics and filters - Digital electronics - Components - Radio frequency communication - Transmission line theory

YEAR 1, SEMESTER 2.

Unit 4 - Computing (ECTS: 5) - C++ - I.T.R.
Unit 5 - Automation and Electrotechnology (ECTS: 6) - Automation - Electrotechnology
Unit 6 - English (ECTS: 3)
Unit 7 - Professional unit, internship (ECTS: 6)
Optional units (choice of 3 out of the 5 on offer):
Unit 8 - Signal Processing Applications (ECTS: 3)
Unit 9 - Introduction to telecom networks (ECTS: 3)
Unit 10 - Microwave measurements and measurement chains (ECTS: 3)
Unit 11 - Introduction to business management (ECTS: 3)
Unit 12 - Scientific calculation (ECTS: 3)

YEAR 2, SEMESTER 3.

Unit 1 - Communication systems, RF and microwave devices (ECTS: 3) - Communication systems, RF and microwave devices - Seminar: Microwave sources
Unit 2 - MEMS microtechnology and application to sensors (ECTS: 5) - MEMS microtechnology and sensors - Seminar: sensors in rail transport
Unit 3 - Material physics and components (ECTS: 3) - Semiconductor physics - Optics - Optics
Unit 4 - Analogue integrated circuit design (ECTS: 5) - Design methodology - Seminars
Unit 5 - Digital integrated circuits (ECTS: 2) - Digital integrated circuit design - Data acquisition
Unit 6 - Digital circuit and memory technologies (ECTS: 1)
Unit 7 - Computing (ECTS: 3) - Java
Unit 8 - English (ECTS: 3)
Unit 9 - Electromagnetic compatibility (ECTS: 1)
Unit 10 - Analysis methods in electromagnetism (ECTS: 1) - Modeling methods in electromagnetism - Simulation and antenna measurements - Seminar: bioelectromagnetism
Optional units (choice of 1 out of the 3 on offer) (ECTS: 3)
Unit 11 - Microwave and millimetric integrated circuits (ECTS: 3)
Unit 12 - Antennas and propagation (ECTS: 3) - Antennas: operation and properties - Propagation channels
Unit 13 - Business and project management (ECTS: 3) - Business management - Seminar

YEAR 2, SEMESTER 4.

4-6 month internship (ECTS: 30)