ESECA
Master of Science and Technology

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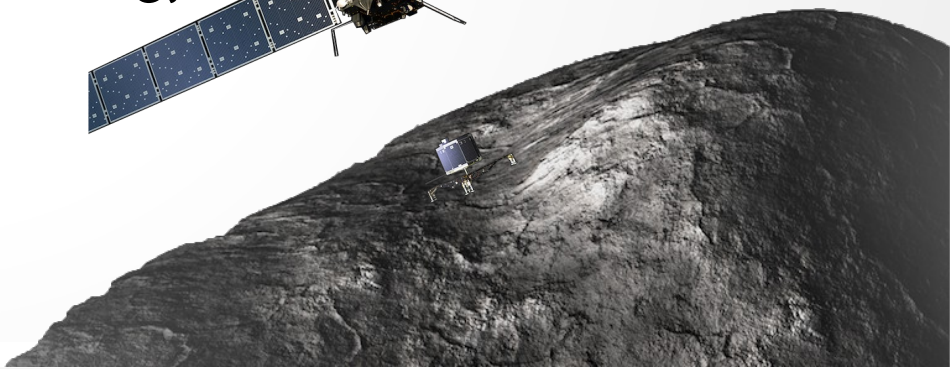
TOULOUSE : WIKIPEDIA REPORT

FACTS

- **4th French city**
  (~ 1 million inhabitants)
- **2000 years of history**
- At the feet of the **Pyrenées**
- Capital of the French gastronomy
- Home of the north hemisphere most awarded rugby team
- **Home of the French and European aeronautics industry**

TOULOUSE : HOME OF THE EUROPEAN AERONAUTICS

- Home of the **AIRBUS** company
- Main **CNES (National Center for Space Study)** facility – part of the **European Space Agency**
- Home of **meteofrance** the French meteorology agency
- **A complete network** of **companies** (Thales, Safran, Honeywell, Intespace,…) and **research labs** (CESBIO, IRAP,…)



TOULOUSE : RESEARCH FACILITIES AND CAMPUS

TOULOUSE is a major position in new technology R&D

- with leading companies : **Continental**, **Freescale**,…
- with innovating start-up : **SIGFOX**
- with major government funded labs : LAAS-CNRS, LAPLACE, IRIT,…

TOULOUSE is an attractive city for students

- Awarded as French preferred city by students
- 100,000 students : 2nd largest student pop. after Paris
- 14,000 international students
- Most important Engineering schools concentration

Université Fédérale
Toulouse Midi-Pyrénées

INPT and INSA

INPT – National Polytechnic Institute of Toulouse
The “7 campus university”

Agronomy (2 sites), Chemical engineering,
Veterinary, Meteorology,
Mechanical engineering
and

Electrical Engineering (ENSEEIHT)

INSA – National Applied Sciences Institute

An Engineering school with a national and international network

5 sites in France + 1 in Morocco

Masters of Science and Technology

6 masters dedicated to foreign students

An illustration of the best filed of expertise at INPT and ISNA

- Electrical Engineering Systems
- Fluids Engineering for Industrial processes
- Water Engineering and Water Management
- Green Chemistry and Processes for Renewable Feedstocks
- Risk Engineering in Industrial Systems
- Electronic Systems for Embedded and Communicating Applications

Objectives of the master ESECA

- To enroll **top-level worldwide students** in the field of electronics
- To provide **top-level and most up-to-date teaching**:
  - In electronics for **embedded systems**
  - In relation to the **aeronautics** industry
  - In tight relation with **research** activities
- To **graduate** students that will :
  - take part in the research labs as **PhD** or **R&D engineers**
  - **Build an International carreer**

ESECA : Electronic Systems for Embedded and Communicating Application

M1

Integration semester (310 h)

Basics of Electronics, Electromagnetism and Signal

Core semester (355 h)

Advanced Electronics, RF electronics and Signal

Basics of Embedded Systems

2 month intermediary internship

M2

Specialization semester (325 h)

Advanced of Embedded Systems

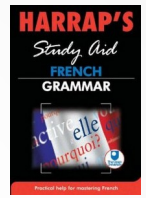
Research project in one of the 3 specialties **(100 h)**

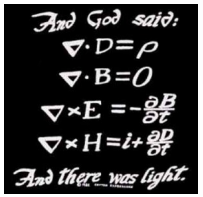
6 month final internship

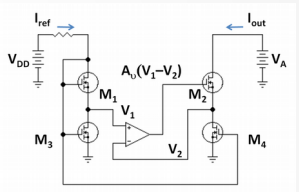
M1

INTEGRATION SEMESTER :

- Extra-scholar support (paperwork, housing, bank,…)
- Intensive French lectures
- Dedicated lectures, tutorials and practicals (small groups) in mathematics, electronics, electromagnetism and signal processing.
- Coding C, µ-controller, DSP







CORE SEMESTER

Lectures, Tutorials and practicals

- **advanced level (intensive):** digital eletronics (VHDL, FPGAs), RF electronics, signal and image processing
- **fundamentals :**mechatronics, telecoms

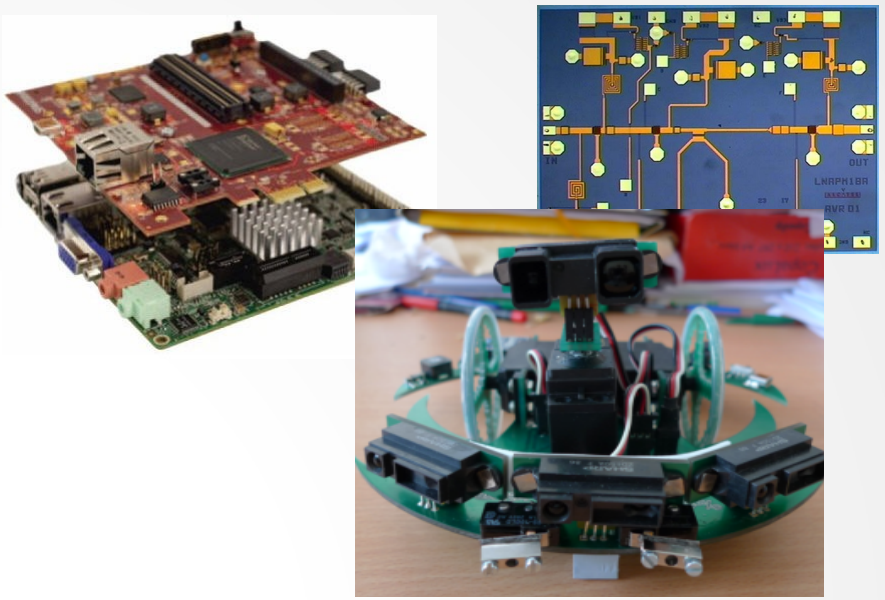
M2

SPECIALIZATION SEMESTER

- Mobile autonomous systems
- Power Management
- Radar & remote sensing
- Telecoms

Intensive laboratory sessions

- Clean room facilities
- Industrial lecturers

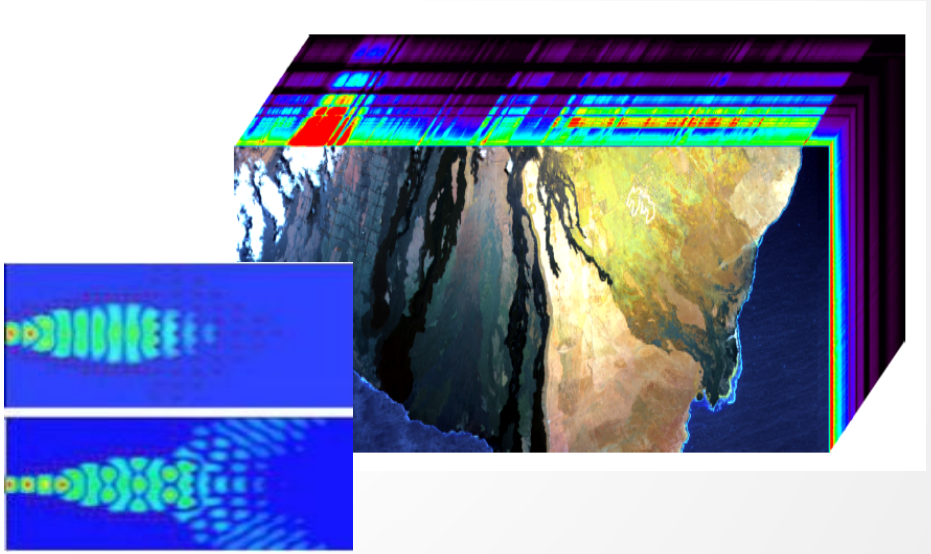


RESEARCH PROJECT

100h in one of the many research institutions of Toulouse (LAAS-CNRS, LAPLACE, IRIT,...)

FINAL INTERNSHIP

6 month in a laboratory or a company



Detailed semester 7

Teaching Unit	Courses	ECTS/ UE
Social Science & Culture	• French (FLE) • Conferences on aeronautics •Communication	4
Math/Programming	• Maths Fourier Analysis • Maths - Complex variable – Vector analysis • Maths Probability/ Statistics • Basis of Programming/ Matlab • C programming • Microprocessor	12
Circuits	• Circuits • Project Analog Electronics • Analog Electronics Practical • Semic-conductor devices • Digital electronics • Filtering • Transmission lines	14

Detailed semester 8

Teaching Unit	Courses	ECTS/ UE
Social Science & Culture	• French (FLE) • English • Conferences on aeronautics • Industrial project	6
Digital Electronics	• VHDL • Front-end acquisition • Digital Electronics project	6
Telecom	• Optoelectronics • Telecoms • Practical Hyper / Opto	5
RF	• Antennas • Passive RF • Active RF circuits	3
Signal and Image	• Signal processing • Digital signal processing • Image processing • Signal & Image processing project	4
Mechatronics	• MEMS • SIP PROJECT • Laser and optical fiber sensing techniques	6

Detailed semester 9

Teaching Unit	Courses	ECTS/ UE
SHS	• French (FLE) • English • Internship presentation • Research project • Conferences on aeronautics • Relation with enterprises	**9**
Embedded Systems	• SoC • Architectures, interfacing and reliability of ES • Mobile autonomous platform project • Digital IC project • MMIC • Payload architecture	**11**
Power Management	• Integrated DC-DC Converters & regulation principles • Drivers and switching management • Multiphase converters • EMC of Integrated Circuits	**4**
Radar and Remote Sensing	• Radar signals • Remote sensing project • RADAR equipment	**3**
Telecoms	• Photonics for HF • Project Embedded optical links • Signal for telecommunication • Space telecoms	**3**

Support

Educational teams

- Department of electronics of N7
- Departement of electrical engineering of INSA

Associated laboratories

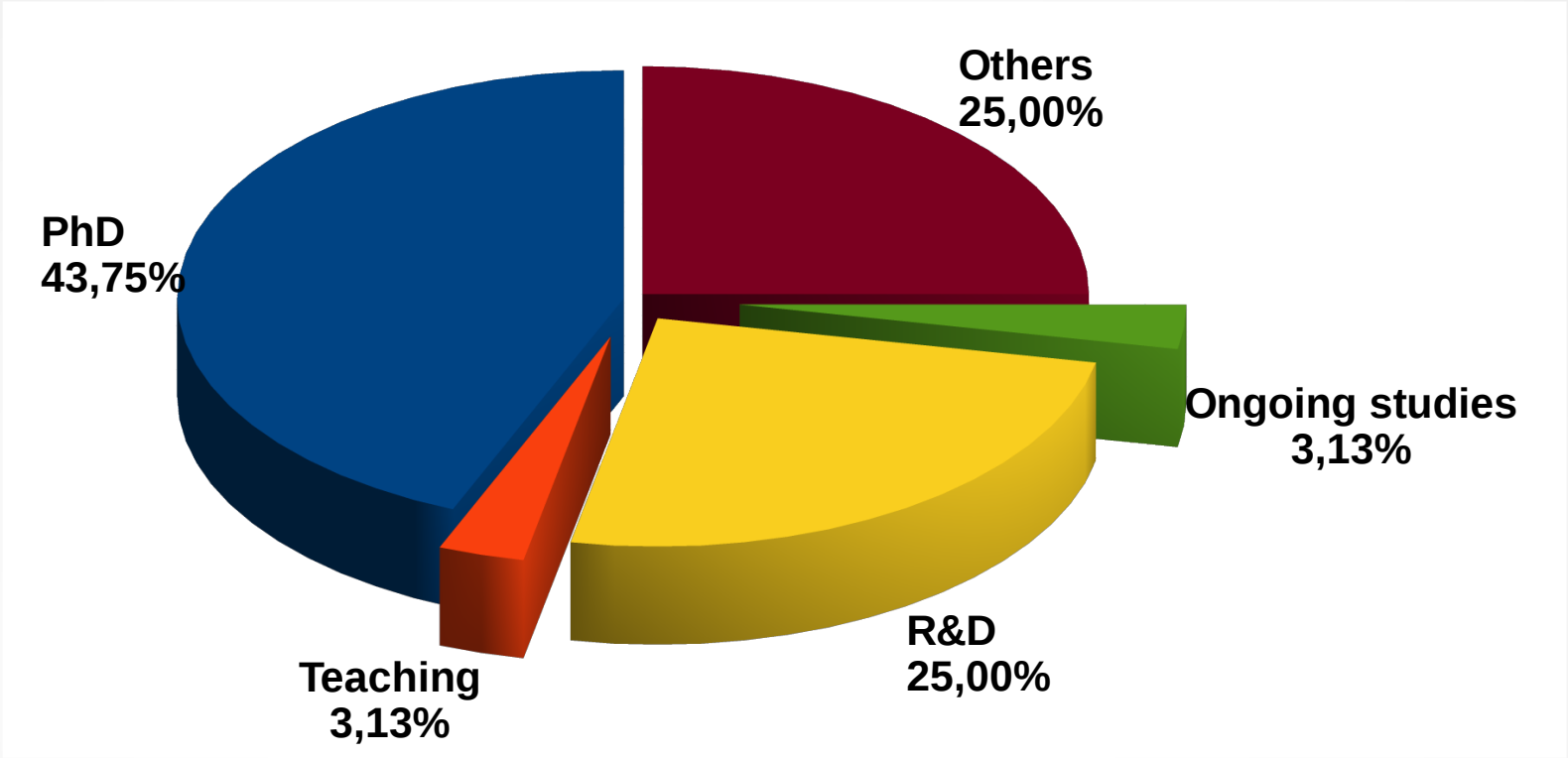
- LAAS-CNRS (**Microelectronics**, **Sensors**, **IoT**, Robotics)
- LAPLACE (**Energy**, Plasmas, **Microwave**)
- **IRIT** (Image/Signal Processing, Telecoms)

Industrial speakers and tutors

- Airbus
- Thales
- Freescale
- etc....

Institut de Recherche en Informatique de Toulouse

Job opportunities



Majority of PhD student (44%) Amongst them moslty private companies (Thales, Technicolor, Schneider,...)

25% work as R&D engineers - mostly small companies

Double diplomas

Double diplomas

- USFQ (Quito, Ecuador)
- DTU (New Dehli, India)
- NTU (Taipei, Taiwan)

M1 in home University

M2 in Toulouse

→ **Direct recruitment at the M2 level**

What they say!

Rafael, Venezuela:
The master ESECA provides continuity with knowledge and expertise in telecommunications already acquired in my country.

Lavinia, Romania: *I have chosen France because of my precedent Erasmus experience in Toulouse. Moreover, this program of Master is very well focused on my preparation as well as on the knowledge I wanted to gain during my Master studies.*

Patricia, Mexico: *The* Erasmus coordinator had told me of this Master and I wanted to take the opportunity. The content is very interesting, as well as the internship

Chetan, India: *I am very satisfied with what I have learnt during the Masters. There is a strong cohesion between the subjects taught at the school and the current demands in the industry. A fine balance was struck between the theoretical courses and the hands-on practicals. The presence of researchers and labs is also very beneficial and necessary. It helped me develop an approach towards analytically responding to a problem.*

Chung, Vietnam: *I got a scholarship from the Ministry of Education to do a master abroad. I chose France because it is a country of ancient culture and the study conditions are favorable. In addition, it is considered one of the best educational places in the world.*