

# Mastère Spécialisé EMBEDDED SYSTEMS

Accredited by the Conférence des Grandes Écoles  
The master program benefits of the strong connections  
with the aerospace and defence industries, as well as automobile, energy, etc.  
developed over the past 100 years by SUPAERO and ENSEEIHT.



Toulouse has one of the greatest concentrations of Embedded Systems industry in Europe with the major aerospace and equipment manufacturers working either for the aeronautical, space or car industry, including Airbus, CNES, Astrium, Continental, Thalès, etc.

Embedded Systems have become essential in several kinds of product in daily life. Embedded Systems encompass a broad class of systems end are actively involved in all domains, from transport systems (aeronautics, space, road, rail and sea), to energy sectors (e.g. nuclear and chemical) and also to communication systems (e.g. mobile phones and PDAs).

The Embedded Systems Master Program is a one-year professional course, designed by the ENSEEIHT and ISAE partners, with the support of the embedded systems industry. Aware of the real need for a multidisciplinary approach, the program prepares students with in-depth and comprehensive knowledge of the underlying technologies involved in embedded systems.

The program focuses on both theoretical and concrete aspects. It aims at:

- developing competencies, at system level design for the development of Embedded Systems, based on strong basics of complementary subjects, such as electronics, computer science, energy conversion and management, automatic control, telecommunications and networks.
- developing the system approach through integrated projects to master specific methods and tools applied to the following domains: aeronautics, space, automobile or multimedia.

The training for this Master's degree is multidisciplinary. It covers all hardware, software and control issues of Embedded Systems within an integrated system based perspective.

## CAREER OPPORTUNITIES

This Embedded Systems Master qualifies our students for employment as designers, developers, research engineers including project managers in design and development of innovative embedded systems. Jobs in consulting companies are also accessible.

### Compagnies recruiting our students :

EADS

ALTRAN  
SUD-OUEST

Atos

Sopra  
group

Also:  
**DCNS Group, SOGETI High Tech,**  
Accenture,  
CS Communications & Systèmes,  
Space Transportation, Astek, Realix,  
Seditec, ESA,  
GE Healthcare Technologies (India),  
Indian AirForce, Philips R&D  
(Netherland)...

## Who ?

Master degree or equivalent degree in science or engineering  
Bachelor degree with 3 years of professional experience at least

## Duration of studies

One year full time  
September to september

## Location of studies

ISAE - SUPAERO Campus  
and  
ENSEEIHT Campus

## HEADS OF PROGRAM

Prof. Jean-Luc SCHARBARG  
Phone: + 33 (0)5 34 32 22 13  
E-mail: jean-luc.scharbarg@enseeiht.fr

Prof. Jérôme HUGUES  
Phone: + 33 (0)5 61 33 91 84  
E-mail: jerome.hugues@isae.fr

## Mastère Spécialisé EMBEDDED SYSTEMS

### PEDAGOGICAL APPROACH

#### First semester

An academic session of around 550-hour, provided by permanent professors of ISAE and ENSEEIHT and experts from industry bringing current knowledge and experience, including: lectures, tutorials, and labs, a multidisciplinary project of 75 h that aims at integrating the academic session into an industrial case study.

#### Second semester

Students have to conduct a professional thesis in an industry or in laboratory, in France or abroad, supervised by a tutor from the host organisation and from ISAE or ENSEEIHT. Thesis is concluded by the preparation of a report and an oral dissertation in front of jury.

### SILLABUS

#### Initial Part - Standardisation - 25 h

Laplace and Fourier Transformers, Transfer functions, frequency response, basic principles of stability, Analogic and digital electronic circuits, Physical principles of energy conversion...

#### Part 1 - Computer science - 47 h

Real time language, Architecture description language, Real time operational systems

#### Part 2 - Control systems - 58,5 h

Design and Validation of DES, Feedback Control, Signal Processing

#### Part 3 - Electronics - 72,25 h

Digital representation of analog signal, Microprocessor and DSP architecture, Architecture and conception of digital integrated systems, Hardware and software co-design...

#### Part 4 - Energy - 63,25 h

Electromechanical and static energy converters, Autonomous energetic systems, Embedded electrical network...

#### Part 5 - Networks - 63 h

Embedded networks, Design and validation of real time protocols, Architecture of fault-tolerant bases...

#### Part 6 - Embedded systems engineering Courses - 95,75 h

System Dependability, Certification, Computer Safety, Optimization, Electromagnetic compatibility, Mechatronics integration

#### Applications - 104,5 h

Real time control of a space system, Hybrid Systems, System Engineering, Real time control of a mechatronics system...

#### Part 8 - ISAE Information system user - 2,5 h

#### Part 9 - Multi-disciplinary project - 20 h

### APPLYING

#### Procedure:

**Through application file, to be downloaded at <http://admissionsmasters.isae.fr>**

Selection is made upon the study of the application file. Interviews can be organized if necessary.

**Deadlines for application : from March to July.**

#### Applications have to be sent:

Institut Supérieur de l'Aéronautique et de l'Espace (ISAE)  
Direction des masters et masters spécialisés  
10, avenue Edouard Belin  
BP 54032  
31055 Toulouse Cedex 4 – France

**Application fees: 67 euros (non-refundable).**

#### Conditions:

##### Applicants having either:

- a master degree or an equivalent degree in science or engineering
- a bachelor degree with 3 years of professional experience at least

##### English proficiency:

Adequate command of spoken and written English is required for admission.  
Language qualification is requested: TOEFL (paper-based): 550, TOEFL (IBT): 79, TOEIC: 750, IELTS: 6.0.  
Except if applicant's first language is English or total instruction of Bachelor or master degree has been provided in English.

#### Tuition:

**Tuition fees: 12 500 euros.**

**French and European Students: 7 000 euros**

(students graduated in the year of application or the year before, and with no professional experience)

### CONTACTS

Philippe GALAUP, Head of recruitment and Contractual Relations  
Marie GUIBBAL, Senior Admission Advisor - Phone: +33 (0)5 61 33 80 28  
Laurence BALLARIN, Senior Admission Advisor - Phone: +33 (0)5 61 33 80 22

E-mail: [info-masters@isae.fr](mailto:info-masters@isae.fr)

**[www.enseeiht.fr](http://www.enseeiht.fr) - [www.isae.fr](http://www.isae.fr)**