Objectives

Embedded Systems are an essential part of almost every aspect of our daily lives from transportation (aeronautics, space, road, rail and sea) to energy and taking into account communication systems. As part of the AeroSpace Valley project, Toulouse has become a key centre in the design of advanced critical embedded systems. Toulouse has one of the highest concentrations of Embedded System industries in Europe with leading aerospace and equipment manufacturers working for the aeronautical, space or car industries, including the Airbus Group and its subsidiaries, CNES, Continental and Thales.

The Embedded Systems Advanced Master Program provides comprehensive training for engineers willing to be a part of the aerospace industry. This Embedded Systems Master Program is a one-year professional course, designed by INP-ENSEEIHT and ISAE-SUPAERO partners with the support of the embedded systems industry to prepare students for challenging aerospace projects.

This program focuses on a multidisciplinary approach and prepares students by passing on in-depth and comprehensive knowledge of the technologies underpinning embedded systems with an emphasis on aerospace. The program focuses on both theoretical and concrete aspects and aims at:

- Developing Embedded-Systems engineering design skills at both system level and function level, built on a solid foundation of complementary subjects: electronics, computer science, energy conversion and management, automatic control, telecommunications and networks;
- Developing a system approach through integrated projects to master specific methods and tools as applied to the following domains: aeronautics, space and the automotive industries. The curriculum is multidisciplinary. It covers hardware (electronics, energy), software (computer science, network links, modeling, analysis and certification) and such issues as Embedded Systems control from an integrated system perspective.
- Part 1: Embedded Systems - Core - 180 h
  - Real-time languages - DES Design and Validation - Feedback control - Signal processing - Microprocessor and DSP architecture - Architecture, design and Synthesis of hardware systems - RF Front-end Architecture - Electromagnetic compatibility
- Part 2: Energy - 63 h
  - Actuator and converter control - Electromechanical and static energy converters - Autonomous energetic systems - Embedded electrical networks
- Part 3: Networks - 67 h
- Part 4: Embedded Systems Design - 160 h
  - Real time control of an space system - Hybrid Systems - Model-Based System Engineering and Architecture - Real time control of a mechatronic system - System Dependability - Certification – Embedded systems and IT Security - Optimization
- Part 5: Embedded Systems Applications - 50 h
  - Aircraft technics - Introduction to Space Systems - Automobile technics - Workshops

Learning approach

First semester:
An academic session of 546 hours of teaching, provided by the tenured professors at ISAE-SUPAERO and INP-ENSEEIHT and industry experts with their up to the minute knowledge and experience. Teaching activities include lectures, tutorials, lab work and a one-month multidisciplinary project aimed at integrating the academic session into an industrial case study.

Second semester:
Students have to conduct a professional thesis or make an internship in an industry or in a laboratory, in France or abroad, supervised by a tutor from the host organization and from INP-ENSEEIHT or from ISAE-SUPAERO. The thesis is concluded by the preparation of a report and an oral dissertation in front of a jury.

Syllabus

Embedded Systems require a collaborative training approach across a broad spectrum of knowledge involving experts from all fields concerned: electronics, energy, science, networks and control systems.

Hence, the academic part of the Master program consists of a 520 hour long program covering all five disciplinary fields that focuses on architectural aspects through a set of application-oriented lectures and seminars.

Organization

Head of program
- Prof. Janette CARDOSO
  Janette.cardoso@isae-supaoer.fr
- Prof. Jean-Luc SCHARBARG
  jean-luc.scharbarg@enseeiht.fr

Course duration
One year full time: 6 months of courses and 6 months of professional thesis or internship.

Course start date
September

Location
ISAE-SUPAERO and INP-ENSEEIHT

Teaching language
English
Career opportunities

Embedded Systems offer challenging career opportunities. The course is designed for both young graduates and experienced engineers seeking a postgraduate program to enhance their technical and managerial skills. The skills acquired in this Master’s course can be applied to any industrial sector in which embedded systems are used: aeronautics, space, road, rail and sea, energy industry, communication systems, etc.

Career opportunities in this area are numerous and on the increase in large and small companies alike. This Embedded Systems Master’s course qualifies students for employment as designers, developers, research engineers and project managers in the design and development of innovative embedded systems.

Companies recruiting our students

Accenture, Airbus Group, Altran, Astek, Atos Origin, CS Communications & Systèmes, NAVAL GROUP, CONTINENTAL, MBDA, Motorola, Realix, Safran, Sogeti High Tech, Sopra Group, ESA, GE HEALTHCARE TECHNOLOGIES, Philips R&D (Netherland), Thales Alenia Space, SIGFOX, ...

INCOSE certification in ISAE-SUPAERO

At the end of the first semester, all EmS students are encouraged to participate in a one-month complementary program in preparation for the ASEP* level of INCOSE (International Council on System Engineering) certification. INCOSE certification consists of an exam which has internationally recognized value to validate knowledge and skills in systems engineering.

*Associate Systems Engineering Professional

Testimonies

Why did you choose ISAE-SUPAERO and apply for our master? What were your objectives?

ISLAM ANOUAR
India, Embedded systems engineering, Graduated in 2017

I have had a passion for aerospace subjects for a very long time. After graduating from the École Centrale d’Électronique in Paris, I decided to round out my training with a sector of expertise at ISAE-SUPAERO. The embedded systems used in the aerospace field are complicated and complex, and to be able to envisage my engineering career in this field with peace of mind, I needed high-level training.

HARIPRASATH SHANMUGASUNDARAM
India, Cockpit Design Engineer at ALTRAN, Graduated in 2016

I worked for 5 years in an aerospace industry. I wanted to leap forward towards international career. I choose ISAE-SUPAERO, because of its reputation, position among the top institutions of France and its excellence in aeronautics and space domain. Moreover, I considered the Embedded Systems Advanced Master would help add competitive skills to my Electronics Engineer background.

According to your experience, which are the strong assets of the Master you did?

The close ties that this institution has forged with research centers and contracting companies in the aerospace sector give us opportunities to talk to many key individuals. These discussions have been rewarding for me as they have encouraged me to take an innovative approach to designing aerospace systems. I was lucky to have found a job before completing my studies at ISAE-SUPAERO. Today, I work as an embedded systems engineer at Thales. My training has enabled me to take on my first job with peace of mind and to quickly become operational.

The course provided me end-end competencies to build embedded system. The courses are taught by experts from both industries (Airbus, Thales, etc) and research establishments (ONERA, etc). Indeed, it was interesting to learn from their experiences and contributions. The innovative assignments and application oriented lab sessions provided opportunities.
Admission procedures

Academic requirements
A master’s degree, or an equivalent degree in science or engineering (or in management for advanced masters in management), or bachelor degree completed by 3 years of professional experience
Tuition fees: see our website
http://admissionsmasters.isae-supraero.fr

Language requirements for Masters in English

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<tr>
<th>TOEFL (IBT)</th>
<th>TOEIC</th>
<th>IELTS</th>
<th>CAE/FCE</th>
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<tr>
<td>85 points</td>
<td>785 points</td>
<td>6.5 points</td>
<td>170 points</td>
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NOTA BENE: Volume of teaching hours and contents of the programs are provided for information only and are subject to change

Selection and admission

Selection and admission are made by an admission committee:
Possible interviews can be organized if necessary

Deadlines for application:
Several admission committees scheduled from January to July, see schedule on our website

Language requirements for Masters in French

Language qualification requested
Score B2-Common - European Framework of Reference for Languages

Application website:
http://admissionsmasters.isae-supraero.fr

Funding
Information on tuitions fees and funding can be found on our website
https://www.isae-supraero.fr/en/academics/advancedmasters/financing

Your contacts

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