



## Objectives

The first objective of this program is to give students a broad understanding of space systems and their environment, constraints and capacities in the fields of earth observation, communications and navigation.

The second program objective is to help students, based on real examples and experimental work, to grasp the value of space systems in terms of creating space applications and services in different fields by integrating or not other data. Students will propose and design tools and solutions in fields including the environment, agriculture, transportation and urban planning, among others.

Students shall be capable of both better understanding the performances of space systems and in turn identifying user needs, and developing new complementary integrated applications and services using data and pictures from space systems and other sources (aerial photographs, for example, or field data...).

## Organisation

**Head of Program:** José RADZIK

**E-mail:** jose.radzik@isae-superaero.fr

**Duration of studies:** One year full time

**Beginning of classes:** September

**Location:** ISAE-SUPAERO Toulouse

**Teaching language:** English.

## Learning approach

The program is divided into **two full-time semesters** including:

- 7 months of courses delivered in Toulouse, mainly at ISAE-SUPAERO
- A 4-6 month mission to be completed in a laboratory, an SME, and in particular at AIRBUS DEFENCE & SPACE

## Core curriculum and options:

The Advanced Masters program, which delivers 45 ECTS, is solely comprised of a core curriculum common to all participants and organized in the following teaching blocks:

- 45 hours of courses on space systems, the main aim of which is to understand the possibilities and constraints of these systems, as well as their functional description and future projects. New Space and constellations will be covered.
- 47 hours of coursework devoted to digital issues, divided into the « big data » aspect and digital communications and networks, a prerequisite to a solid understanding of the performances and use of space systems for different applications,
- 254 hours of coursework covering three theme-based teaching blocks (Earth Observation, Space Telecommunications, and Satellite Navigation) allowing to better understand related requirements and challenges, space system performances, the processing and use of space data to develop different types of services in diverse fields. The 254 hours are split as follows:
  - 115 hours of coursework devoted to satellite-based earth observation and applications and services directly using space data,
  - 25 hours focusing on the principles, performances and use of satellite navigation and positioning systems completing the panorama of satellite systems used for applications and services under development in many areas,
  - 114 hours on space telecommunications and related services,
  - 25 hours devoted to space application-related legal, regulatory, and economic/business issues.

These legal issues cover data law as well as telecommunications frequency management and Space Operations Law. The value chain and the economic context as well as marketing tools shall be addressed.

- A 20 hour course on integrated services and applications will concretely address examples of the development of services using space data, among others. Users of these services may participate in this training.



A conference series shall complete the program in the areas of space and geopolitics and the major principles of intellectual and industrial property rights.

### **Company internship, professional thesis:**

Once coursework has been completed, students shall complete a personal project prepared within the framework of a company internship. This project shall last from 4 to 6 months, with a maximum of 35 hours per week. Upon completion of the project, the student shall defend his or her professional thesis in front of a jury. Students shall earn 30 ECTS for the thesis.

Overseen by an academic advisor and in-company tutor, the project entails the acquisition and development of knowledge and skills within a professional framework.

The subject, which must be approved by the academic advisor and the Director of the Advanced Masters programs, must :

- Give the student the opportunity to prepare for professional activities targeted by the program,
- Be a genuine issue of concern to experts working in the field.
- Must be related to the needs of companies in activity sectors covered by the program.

Students who have already acquired professional experience prior to the program, may complete their project in a research center or laboratory.

## ■ Syllabus

### **Space systems – 45 h**

Space systems introduction

### **Digital techniques – 47 h**

Big data and cloud

Digital communication and networking basics

### **Earth observation – 115 h**

Remote sensing and sensors

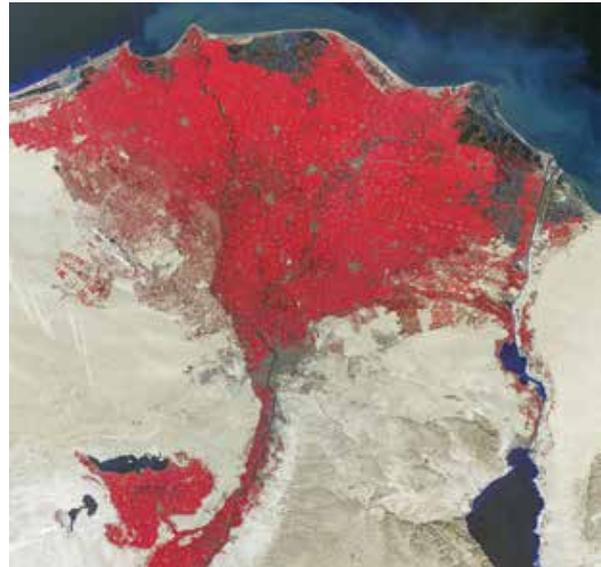


Image processing and data analysis  
Earth observation applications and services

### **Navigation and positioning – 25 h**

Navigation: performances & applications

### **Space telecommunication - 114 h**

Broadband satellite communication systems

Satellite broadcasting

Telecommunication satellites for mobiles

Satellite telecommunication business

### **Space economics and regulations – 25 h**

Space applications economy and marketing/laws and regulations

### **Services and integrated applications – 20 h**

End-\*user integrated applications and services

## ■ Career opportunities

This advanced master degree offers career opportunities in a wide range of fields :

Jobs related to crossdisciplinary use of space data (observation of the earth and its atmosphere, telecommunications, data positioning, data from scientific missions and exploration) in complex information systems

Consulting jobs to identify and define requirements, and implement application solutions using space data,

New jobs related to New Space challenges.

The advanced master «Space Applications and Services» guarantees a high level of expertise required for today's and tomorrow's international space-related jobs.

Program graduates go on to work as Project Leaders, Business Engineers, Business Development Managers , Consulting Manager, Research Engineer, Expert in Space Applications

## Advanced Masters

### Academic requirements

Applicants must have a Master degree, or an equivalent degree in science or engineering, or a bachelor degree with 3 years of professional experience at least.

### Tuition fees 2017:

	EU		Out of EU	
	reduced tuition fees <sup>1</sup>	tuition fees	reduced tuition fees <sup>2</sup>	tuition fees <sup>3</sup>
SPAPS	7 500 €	12 500 €	12 500 €	18 000 €

<sup>1</sup> for students graduated in the year of enrollment or the year before and with no professional experience

<sup>2</sup> for individual applicants

<sup>3</sup> fees for public agencies and private companies available upon request from Philippe Galaup at: philippe.galaup@isae.fr, Head of recruitment and Contractual Relations

## Selection and admission

### Admission to ISAE's master at:

<http://admissionsmasters.isae-supero.fr>

### Selection and admission are made by an admission committee:

> possible interviews can be organized if necessary

### Deadlines for application:

> several admission committees scheduled from February to July 2017, see schedule on our website: [www.isae-supero.fr](http://www.isae-supero.fr)

### Application fees:

> 70 € (non-refundable)

## Language requirements

### Language qualification requested:

- > TOEFL (IBT): 79 points (Inst. code: 9820)
- > or TOEIC: 785 points
- > or IELTS: 6.5 points
- > or CAE.

## Your contacts at ISAE-SUPAERO

**Philippe GALAUP**, Head of recruitment and Contractual Relations - Phone : +33 (5) 61 33 80 27

**Laurence BALLARIN**, Senior Admission Advisor - Phone : +33 (5) 61 33 80 22

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# ISAE in few words

ISAE-SUPAERO is a world-class higher institute for aerospace engineering education and research. Nowadays with a student corpus of over 1600, ISAE-SUPAERO is one of Europe's largest Aerospace Institute offering graduate and postgraduate programs. Yearly, ISAE-SUPAERO awards around 20% of master's degrees in Europe in aeronautics and space field. ISAE-SUPAERO develops its worldwide reputation on the prestige of its master's programs, the fame of its teaching staff, or the excellence of its research but also on the high-value of its graduates, their skills in engineering or management, as well, their capacity to evolve within a very high-technology environment, their enterprising mind and international opening..

## Identity card



**Name:** Institut Supérieur de l'Aéronautique et de l'Espace (ISAE).

**Legal Status:** Public Institution of higher education and research.

**Endorsements and awards:** CTI agreement of the two «Diplôme d'ingénieur», Conference des "Grandes Écoles" for postgraduate Advanced Masters and "Ministry of Higher Education and Research" for Masters of Science.

**Faculty:** 100 professors and researchers.

**Employees:** 400.

## A campus fully renovated in 2015

ISAE-SUPAERO campus is located in Toulouse, along the Canal du Midi (UNESCO world heritage).

It is composed of:

- » wide range of sports facilities including swimming pool, tennis and squash courts, sports hall, football and rugby fields, climbing wall and fitness room,
- » 6 students halls of residence : 1000 rooms and studios apartments, all connected to high-speed network,
- » a restaurant.

The campus is located in the Ranguel scientific complex, close to:

- » ONERA French aerospace research centre
- » CNES - French space agency
- » 2 CNRS (National Center for Scientific Research) laboratories
- » University and engineering schools.

## Key figures

**1** «diplôme d'ingénieur» ISAE-SUPAERO in French

**1** Master of Science ISAE-SUPAERO in English

**1** «diplôme d'ingénieur par apprentissage»

CNAM-ISAE (co-op master program)

**15** Advanced Masters including 10 in English

**5** Masters in French

**6** PhD Programs

More than **1600** students including **1400**

masters and more than **220** PhDs

**81** international cooperation agreements



**a set to facilitate settlement of new students in Toulouse city.**

*Including: bank account opening, housing insurance, accommodation booking, immigration formalities, public transportation card, SIM card, Guided tour of Toulouse city*