

# Space Communications Systems

(ISAE, ENSEEIH, TELECOM Bretagne, TELECOM SudParis)

Accredited by the Conférence des Grandes Écoles

*The ISAE's Masters programs benefit 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 ENSICA merged under a unique Institute in 2007.*

## Aims

Satellite System is an inescapable vector of communications as far as it has demonstrated its capability to collect and spread, better than any other network, messages and data in a vast coverage area for the benefit of thousand users, since the sixty's. Even if the space communications market remains a niche market of the global telecommunications business, it represents one of the most commercially profitable space applications in ceaselessly evolution. Consequently companies of the sector, for space system development or for services and applications, recruit permanently junior executives with a specific expertise adapted to the specificities of the environment and quickly operational.

The Master SCS is designed to offer students with necessary and up-to-date knowledge for mastering different aspects of digital communications, signal processing, and networks techniques used in the communication or navigation systems design for aeronautical or space applications.

So, the Master SCS emphasizes on the following objectives:

- give global approach of systems by emphasizing the environments, the limitations and the constraints, the interfaces and the expected performances,
- improve the disciplines interacting in the conception of these systems: signal processing, communications, data processing and networks, etc.
- acquire and Master design and simulation tools of the sector,
- initiate into the development of applications of these systems for space, aeronautical and embedded-systems domains.

## Organization

### Heads of Program

Prof. Marie-Laure BOUCHERET

Phone: + 33 (0)5 61 58 80 16

E-mail: marie-laure.boucheret@enseeiht.fr

Prof. Michel BOUSQUET

Phone: + 33 (0)5 62 17 80 86

E-mail: michel.bousquet@isae.fr

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

**Beginning of classes:** September

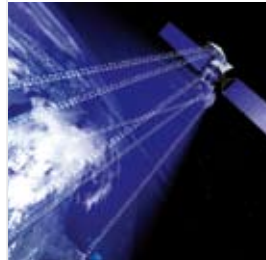
**Location:** ISAE-SUPAERO and ENSEEIH Campuses

## Pedagogical approach

**First semester:** academic session of around 400h, provided by ENSEEIH and ISAE's permanent professors and experts from aerospace industry bringing current knowledge and experience, including:

- lectures, tutorials, experimental and practical sessions, online exercises, practical works in team, simulation with MATLAB, OPNET, or specific software,
- 3 projects carried out in pairs for about 100 hours globally,
- conferences, demonstrations in laboratory, experimentations on links, navigation receivers (GPS, etc.).

**Second semester:** students conduct a professional thesis in aeronautical industry or organisation, in France or abroad and supervised by a tutor from the host organisation and from ISAE, ENSEEIH or TELECOM Bretagne. The thesis is concluded by the preparation of a report and an oral dissertation in front of jury.



## Syllabus

Project management  
Basics on signal, electronics, communications and networks  
Signal processing and source coding  
Digital communications  
Spread spectrum techniques  
Coding and modulation for satellite channel  
Networks and protocols for communications  
Antennas and microwaves components  
Space systems and specific techniques components  
Orbits and satellites platforms  
Radiofrequency links and propagation  
Space communications systems  
Navigation and localization systems by satellite  
Communication and navigation satellite payload  
Digital filters and processing  
Communications and navigation digital receivers  
Ground stations and terminals  
Workshops (1)  
Network simulation tools  
Integrated circuits and functions  
Aeronautical and space applications  
Communications networks by satellites  
Introduction to embedded-networks  
Mobile communications and multimedia  
Legal and economic aspects  
Overview of space systems applications  
Workshops (2)

## Who can apply?

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

### How to apply?

- Through application file, to be downloaded at [www.isae.fr](http://www.isae.fr).
- Selection is made upon the study of the application file, possible interviews can be organized if necessary.
- Deadlines for application: from April to July 2009.
- Application fees: 65 € (non-refundable).
- Applications have to be sent:  
Institut Supérieur de l'Aéronautique et de l'Espace  
Direction des Masters et mastères spécialisés  
10, avenue Édouard-Belin - BP 54032  
31055 Toulouse Cedex 4 - France

### English proficiency

Adequate command of spoken and written English is required for admission.

Language qualification is requested TOEFL: 550 (paper-based)

Except if applicant's first language is English or total instruction of Bachelor or Master degree has been provided in English.

**Tuition fees 2009-2010:** 12 000 €.

French and European Students: 6000 € (students graduated in the year of application or the year before, and with no professional experience).

Dates: sept. 2009 - sept. 2010.

### Contact information

- Michel CHAUVIN, Deputy Director of Masters Programs: [michel.chauvin@isae.fr](mailto:michel.chauvin@isae.fr)
- Marie JENTET, Information and Marketing Manager: [marie.jentet@isae.fr](mailto:marie.jentet@isae.fr)
- Web: [www.isae.fr](http://www.isae.fr)

### Industrial Partnerships

THALES has selected the Specialized Master Embedded Systems for its THALES Academia program: a partnership between Thales group, leading French engineering and business schools and the Ministry of Foreign Affairs. Every year scholarships are offered to students from Brazil, China, India and Russia.

[www.thalesgroup.com/extra/academia/index\\_en.htm](http://www.thalesgroup.com/extra/academia/index_en.htm)

### Career opportunities

This specialized Master in space communications systems offers students various junior executive positions in systems design leading to the management of projects in navigation and communications space systems sectors.

### Companies recruiting our students

- Electronics and telecommunications companies: Alcatel, EADS, Thales, Safran, St Micro
- Communications operators: Eutelsat, Hispasat, Société Européenne de Satellites, Telespazio
- Space agencies and research centers: CNES, DSNA, DLR, ESA
- Consulting groups: M3 Systems, Altran, France Développement Conseil, etc.