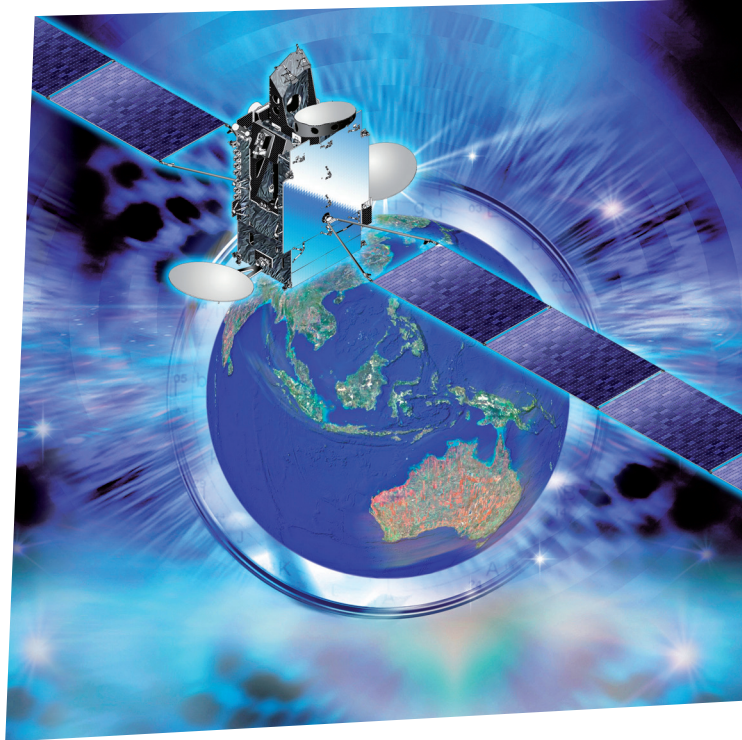


# Space Systems Engineering

Accredited by the Conférence des Grandes Écoles



## Aims

The TAS Astro - Space Systems Engineering Specialized Master degree program is a one-year professional course of study. The TAS Astro specialized Master allows students to develop a high level of competence in engineering science, current technology, engineering design and management of space systems. The TAS - Astro program is highly multidisciplinary and is aimed at developing engineering skills to easily enter the work world with great opportunities and significant chances of advancement on aerospace projects, either in a agency or in a company in a multinational environment.

The program is designed for students starting immediately after the completion of their graduate degree and for industrial employees who have enrolled through their companies' continuing education programs.

The TAS Aero curriculum includes a broad spectrum of subjects with the following objectives:

- ➔ to develop specific skills applied to space sector, in design development, space systems engineering and management of space projects,
- ➔ to acquire high competences related to technical aspects, international economical and legal concerns of space projects.

## Organization

**Head of Program:** Prof. Bénédicte ESCUDIER

**E-mail:** benedicte.escudier@isae.fr

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

**Beginning of classes:** September

**Location:** ISAE, Campus SUPAERO

**Teaching language:** English

## Pedagogical approach

**First semester:** academic session of around 410h, provided by ISAE's permanent professors and various experts bringing current knowledge and experience from research center (ONERA), Space agencies (CNES, ESA), or European aerospace industry (Thales Alenia Space, Astrium/Space Transportation, Astrium/Satellites, Safran/ SNECMA, etc.).

This first semester includes:

- lectures, exercises, labs,
- engineering and design study seminars,
- laboratory sessions,
- written report and oral presentation,
- practical sessions, team work and industrial visits.

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

## Syllabus

### Part 1 - Missions and Systems - 140 h

Space environment and effects  
Orbital Mechanics and mission analysis  
Dynamics and attitude Control  
Reliability, Availability, Maintainability, Safety of space systems  
Design of Launch Vehicles and Space Systems  
Space communications  
Operations and manned space missions  
Navigation and localization satellite systems

### Part 2 - Space projects environment - 120 h

Examples of space projects  
Space economics and law  
Quality seminar  
System engineering for space systems - Case study  
Integrated team project

### Part 3 - Satellites and Systems - 150 h

Space propulsion  
Satellite engineering  
Digital control and real-time control by computer  
Study case: attitude control of satellite

Advanced control  
Guidance and control of satellites  
Guidance and control of launch vehicles  
Electrical architecture of satellites  
Data processing architecture of satellites and on-board management

### Part 4 - Conferences and seminars

Visits of companies: Intespace, ASTRIUM/ST, ONERA.

### Part 0 - Harmonisation

A harmonization program can be offered to students in accordance with their initial education background, in particular in signal processing and automatic control.

## Career opportunities

This TAS Astro Specialized Master program leads students to technical employment either in international industries or in research centers in aerospace world. Current position are: Project Managers of space systems, Experts in industry or public research laboratories, or in Consulting and services companies, etc.

### Companies recruiting our students

EADS Group, Altran Group, Aéroconseil, Seditec, Snecma Groupe, Transiciel, Astek, Sagem, Thales Alenia Space, Esa, Inpe (Brazil), Instituto Mexicano de Comunicaciones (Mexico).

## Witness

### Mireia JOYA – Spain, SM TAS ASTRO graduated 2010

«The great quality of the ISAE's master has helped me to shape my future the way I imagined. It has been a unique learning experience not only because of the numerous lecturers from different areas of the Space Industry we had but also because it brought me the opportunity to participate in a very interesting project at EADS Astrium. I will always remember with great pleasure the friendship I made with students from all over the world. After the master graduation I joined ALTRAN Toulouse as space thermal engineer».

# Common ISAE's admission procedures

## Postgraduate Specialized Masters in engineering

**SM TAS Astro: Tuition fees:** 12500 €

**French and European Students:** 6500 € (students graduated in the year of enrolment or the year before and with no professional experience)

### 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

## Selection and admission

### Admission to ISAE's master at:

<http://AdmissionsMasters.isae.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 April to June 2011, see schedule on our website: [www.isae.fr](http://www.isae.fr)

**Application fees:** 65 € (non-refundable)

## Language qualification requested

**English:** TOEFL (Paper-based): 550; TOEFL (IBT): 79; TOEIC: 750;  
IELTS: 6.0, CAE Cambridge, ...

## Your contacts at ISAE

- Michel CHAUVIN, Deputy Director of Masters Programs:  
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The "Institut Supérieur de l'Aéronautique et de l'Espace" (ISAE) was created in 2007 from the merger of the two prestigious French graduate and postgraduate schools of engineering, SUPAERO and ENSICA. Today, ISAE, is a world-class higher institute for aerospace engineering education and research. Nowadays with a student corpus of over 1500, ISAE is one of Europe's largest Aerospace Institute offering graduates and postgraduates programs. Yearly, ISAE awards around 20% of master's degrees in Europe in aeronautics and space field. ISAE 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.

## Key figures

- ➔ 2 Graduate Engineering Programs: SUPAERO and ENSICA
- ➔ 15 Specialized Masters including 11 in English
- ➔ 2 Masters of Science
- ➔ 9 Research Masters
- ➔ 6 PhD Programs
- ➔ 1500 students (1300 masters and 200 PhDs more or less)
- ➔ 160 international cooperation opportunities
- ➔ 50 academic and research partnerships

## Identity card

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

Founded in 2007 - as the result of the merging of SUPAERO (1909) and ENSICA (1945)

**Legal Status:** A large public institution of scientific, cultural and vocational missions

**Trustees:** Délégation Générale pour l'Armement (DGA) [French Defence Procurement] - Ministry of Defense

**Endorsements and awards:** CTI agreement of the two Graduate Programs, Conference des 'Grandes Écoles', for postgraduate specialized masters Ministry of Higher Education and Research for Masters of Science

**Staff:** 450 permanent staff

## Contacts ISAE

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