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SPACE

Space systems engineering & Space exploration

■ Objectives

The TAS Astro - Space Systems Engineering Advanced Master program is a one-year professional course of study. The TAS Astro Advanced Master allows students to develop a high level of multidisciplinary skills in space science, space systems engineering and space project management. It enables the students to access work opportunities with numerous career opportunities in aerospace projects, be it with space agencies, research agencies, or industrial companies in an international landscape.

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

The TAS Astro 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.

■ Learning approach

First semester: academic session of 560h, provided by ISAE-SUPAERO's permanent professors and various experts bringing current knowledge and experience from research centers (ONERA), space agencies (CNES, ESA), or European aerospace companies (Thales Alenia Space, Airbus Defense & Space, ArianeGroup).

This first semester includes:

- lectures and exercises,
- engineering and design study seminars,
- laboratory sessions,
- written reports and oral presentations,
- practical sessions, team work and industrial visits.

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

■ Organization

Head of program

- Prof. Stéphanie LIZY-DESTREZ
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Course duration

One year full time

Course start date

September

Location

ISAE-SUPAERO

Teaching language

English

■ Syllabus

Part 1 - Missions and Systems 155 h

Mission analysis and orbital mechanics – Space environment & effects – Space systems architecture: Ground segments, satellites & sub-orbital planes – Launchers architecture

Space communication systems – Satellite based localization systems - GNSS – Human Spaceflight: History of space exploration, medical aspects & human factors

Part 2 – Space Programs 160 h

Introduction to quality processes – Space programs bid for tender – Space programs & projects – Systems engineering of space programs – Systems dependability – Integrated team project – Financial & legal aspects: debris situation, new space (nanosatellites & launchers) – Spacecraft operations

Part 3 - Sub-systems: Satellites & Launchers 189 h

Advanced control & applications - Estimation and filtering - Satellite AOCS – Launchers guidance and control - Real time control of a space system- On board data handling sub-systems: functions and architecture-satellite electrical systems – satellite thermal control systems- satellite propulsion: chemical & electrical – Mechanical architecture: Space structures & mechanisms

Space Exploration Development Systems

The SEEDS (Space Exploration Development Systems) international placement is an optional extra project during which you will work in multidisciplinary teams on topical space exploration research projects, designed in collaboration with advisors from the space industry.

ISAE-SUPAERO's partners in SEEDS are the Politecnico di Torino in Italy and the University of Leicester in UK. All three institutions have strong links with the space industry, a heritage of space research and exploration, and high-level expertise in the delivery of teaching. You will spend two months at each institution and will be required to cover basic travel and subsistence costs. The course is taught in English at all three sites.

The international SEEDS program is supported and endorsed by the Italian (ASI), French (CNES) and UK Space Agencies, as well as Thales Alenia Space, ALTEC and numerous other companies and institutions.



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■ Career opportunities

TAS Astro Advanced Master program leads students to technical employment either in international industries or in research centers in aerospace world.

Current positions are: Project Managers of space systems, Experts in industry or public research laboratories, or in Consulting and services companies, etc.

Companies recruiting our students

Altran, Airbus Defense & Space, Aéroconseil, Astek, Atos Origin, Bertin, Eutelsat, Eurilogic, GIST, Saipem, Seditec, Safran, Sopra Group, Transiciel, Thales Alenia Space, CNES, ESA, CTA (Brazil), Inpe (Brazil), DLR (Germany), Instituto Mexicano de Comunicaciones (Mexico), GTD Sistemas de Información (Spain), Hispasat (Spain), Aerospace Computing Inc/AMES (USA), etc.



Testimonies

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

After a Mechanical Engineering Degree at INSA de Toulouse with two specializations in Aerospace Engineering abroad, my ambition was clear: I wanted to work in the space sector. I therefore decided to apply for the Space Systems Engineering Advanced Master provided by ISAE-SUPAERO to develop specific skills in Space System Engineering and in Management of space projects. My objectives were to benefit from ISAE-SUPAERO in Aerospace Engineering in order to increase my employability on a very competitive job market.

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

I would like to emphasize the quality of the theoretical and practical courses provided by numerous passionate industrial experts, researchers and ISAE-SUPAERO teachers.

The Master is well organized, turned towards an industrial application: it allows students to build a first network for future

internships and jobs. The topics covered are complementary and provide strong knowledge.

The knowledge is then applied through very interesting projects. To cite two examples: we worked per groups on the design of a Human permanent outpost on Phobos for up to 12 astronauts and on the development of a space transportation solution from Low Earth Orbit to Geostationary Orbit for commercial satellites.

At last, I also took the SEEDS option where I worked for 6 months with 38 other European students on a manned mission on the Moon to produce propellant by exploiting Lunar In-Situ Resources as a System Engineer and Project Manager. In addition to keep learning, this project allowed us to travel a lot in Europe and make contacts.

Which are your career plans ?

Once the SEEDS project completed, I would like to work as a System Engineer or Program Manager on an innovative space project in relation with Advanced Concept, Space Exploration or Human Spaceflight missions. My dream is to work for a Space Agency and/or launch my own company one day.

PAULINE DELANDE
Graduate in 2018



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■ Admission procedures

Advanced Masters

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

Application website :

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

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 English

TOEFL
(IBT)



85 points

or

TOEIC



785 points

or

IELTS



6.5 points

or

CAE/FCE



170 points

Language requirements for Masters in French

Language qualification requested

Score B2-Common - European Framework of Reference for Languages



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■ *Your contacts*

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