

# Systems Engineering

## Objectives

Systems Engineering is an interdisciplinary discipline of engineering combining all sciences and technologies into integrated team from design, to development, up to operations and disposal of competitive and complex systems.

Systems Engineering approach is the capacity to federate and control various, interweaving and complementary engineering activities. This approach goal is to deliver satisfying systems, on-time, within expected budget, with the level of quality and performances meeting requirements of an open and competitive market. Systems Engineering process implements technical processes (requirement engineering, design, integration, verification, validation, etc.) as well as project management processes, agreement processes and enterprise processes.

The Systems Engineering Master degree program is a one-year professional course of study, designed in partnership with the industry. This program aims at providing worldwide industry with skilled professionals in Systems Engineering able to specify, design, deploy and maintain competitive and complex systems, fit to purpose, in various industrial sectors: space, aeronautics, air traffic control, land transport systems, maritime transport, health industry, engineering, communication systems, etc.

## Organization

### Head of program

- Prof. Jean-Charles CHAUDEMAR  
jean-charles.chaudemar@isae-supaeo.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

### Teaching language

English

## Learning approach

First semester: academic session of around 500 h, provided by ISAE-SUPAERO's permanent professors and experts from industry bringing current knowledge and experience, including: lectures, tutorials, industrial study cases. And 45h devoted to the coaching of the Integrated Team Project run all along the semester.

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 ISAE-SUPAERO. The thesis is concluded by the preparation of a report and an oral dissertation in front of a jury.

## Syllabus

### Teaching part (First semester)

#### Part 1: Outlines, topics and Fundamentals - 41h

Systems Engineering Introduction, Introduction to Space Systems, Project Management Introduction, Introduction to verification & validation,

#### Part 2: Roles : processes and Specialities - 167 h

Requirements engineering, Systems modelling and Analysis, Systems design and architecture, Integrated Logistic Support, Project Technical Management

#### Part 3: Deployment, methods & tools - 165 h

Systems Engineering Data Technical Management, «Optimise, decide, justify, & Validate», Systems Dependability, Systems performance Assessment & Management

#### Part 4: Industrial applications, study cases - 97 h

- Airbus : Systems Engineering & Certification of the A350
- Dassault : Systems Engineering at Dassault Aviation
- DGA : System of systems (systems engineering methods and tools, introduction to space system)

#### Part 5: Integrated Team Project (ITP) - 45h

## Career opportunities

Systems Engineering is now a real and permanent concern for any business players, from Major Governmental contractors, to equipment manufacturers, to prime contractor integrating systems, and services companies such as Airlines for instance.

Systems Engineering jobs are characterized by many disciplines:

- multidisciplinary - mechanics, electronics, information technology, etc,
- strong interface with project management,
- permanent concerns all along the life cycle of a system. Need of Systems Architects is increasing for both industries developing, producing and maintaining large complex systems (aircraft, ships, military and defence systems, cars, etc.) and other industries developing and producing smaller high technology products (cameras, mobile phones, printers, computers, etc.). This Master program offers students great opportunity to join Engineering Team Systems within industries in different economic sectors.

### Companies recruiting our students

Safran, CAST, Luxembourg Space Telecommunication, Dassault Aviation, Airbus Group and its subsidiaries, EGIS Avia, Arianespace, ALTEN, AKKA, Seditec, Safran Transmission Systems, Thales Alenia Space, INPE (Brazil), AVIC (China), COMAC (China), Thales China, Geo-Informatics and Space Technology Development Agency (Thailand).

INCOSE

### INCOSE certification in ISAE-SUPAERO

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





## Testimonies

### Why did you choose ISAE-SUPAERO and apply for this MS ? What were your objectives ?

**GEOFFROY LE COURTOIS DU MANOIR**  
Staff Research Engineer - Caltech  
Graduated in 2020

**👂** I graduated in 2007 and have been part of Thales since 2015. Before starting the training program, I was working as a systems engineer for airborne equipments. My activities were related with maintenance and customer support services. I was in charge of developing and validating solutions in accordance with the stakeholders' needs. I liked my job very much because of the autonomy I had, driving experts and suppliers from a set of needs towards one solution. However, as I am passionate about aerospace, and since my job was focused on ground support equipments, such as transportation

cases, hand maintenance tools and test benches, I felt a discrepancy between my work and the field I like. Also, despite having learnt Systems engineering online with MOOCs and by the practice, I pinpointed the need for a real and in-depth training :

- \*to get a big picture of the activities involved in the V-cycle,
- \*to grab the appropriate methods and tools,
- \*and to understand the challenges to come.

I chose to apply to the Systems Engineering Advanced Masters program at ISAE-Supaéro to further excel in my job, to get hands on aerospace systems engineering projects and to get the chance to go working abroad.

### According to your experience, what are the strong assets of the Master ?

Teachers are mostly coming from industry and are working on aerospace systems engineering projects. **The messages delivered are consistent with the skills, methods and tools the aerospace industry is currently looking for.** Some researchers also take part in the teaching team. Being passionate people, they bring more theoretical knowledge with expertise on specific matters. They open doors to future interesting challenges.

\*ISAE-SUPAERO is the reference engineering degree school in France and Europe about aerospace training. ISAE is also very well known in companies and provides strong assets when negotiating a job offer.

\*ISAE-SUPAERO owns an alumni network with 25K former engineers, settled in most well-known companies, on the edge leading technology. Teachers and professional classmates are also a great way to expand one's network and plan a professional career.



## 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

Tuition fees : see our website

### LANGUAGE REQUIREMENTS FOR ALL MASTERS

<b>TOEFL (IBT)</b>	or	<b>TOEIC</b>	or	<b>IELTS</b>	or	<b>CAE/FCE</b>
						
<b>85 points</b> <small>(Inst. code: 9820)</small>		<b>785 points</b>		<b>6.5 points</b>		<b>170 points</b>

NOTA BENE : Volume of teaching hours and contents of the programs are provided for information only and are subject to change.

### LANGUAGE REQUIREMENTS FOR MASTERS IN FRENCH

#### Language qualification requested

Score B2-Common - European Framework of Reference for Languages

### ■ SELECTION AND ADMISSION

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

Possible interviews can be organized if necessary

#### Deadlines for application:

Applications open in october 2020 for intake in september 2021.

Several admission committees scheduled from January to July, see schedule on our website

Application website :

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



#### Funding

Information on tuitions fees and funding can be found on our website

<https://www.isae-supaero.fr/en/academics/advanced-masters/financing/>

### Your contacts

#### Caroline ARMANGE

Senior Admission Advisor / Advanced Masters

Phone: + 33 (5) 61 33 80 25

#### Catherine DUVAL

Senior Admission Advisor/Aerospace sector

Phone: +33 (5) 61 33 80 37

Senior Admission Advisor / Masters programs

Phone: +33 (5) 61 33 80 13

[info-master@isae-supaero.fr](mailto:info-master@isae-supaero.fr)

[www.isae-supaero.fr](http://www.isae-supaero.fr)