

Mastère Spécialisé® / Advanced Master

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, energy, communication systems, etc.

■ Organization

Head of program

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

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.



■ Syllabus

Teaching part (First semester)

Part 1: Outlines, topics and Fundamentals - 41 h

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

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) - 45 h

■ 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...
- 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)...





Testimonies

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

FLORIAN ROSELLI
 Graduated in 2020
 Human Spaceflight Engineer | MEDES for CNES/CADMOS
 (French Space Agency)

As a general engineer, my deepest ambition was to combine my great interest for space and aeronautics to my field of study and professional career. I decided to apply for the Systems Engineering (SEN) Advanced Master while I was completing my last year of engineering studies in HEI-Lille. As a prestigious school in France and Europe about aerospace training, ISAE-SUPAERO seemed the obvious choice to me. The strong international alumni network, partner universities and companies offer an excellent environment to evolve and give rise to ambitious ideas.

The SEN Advanced Master seemed to be the most relevant with my background and ambition. Indeed, I was looking to broaden my skills in system design and architecture, requirements engineering and to acquire an overview on the multiple aspects of a project. Most of all, I deeply desired to inspire from other ways of working in order to become an active part of the rise of new challenges regarding space exploration/research and aeronautics.

PRAKHAR AGARWAL
 Cohort 2020/2021

Intern in (Re)Architecture with Environmental Concerns | Altran

I was keen to pursue Systems Engineering since my under-graduation days, when we were working on a Sounding Rocket. And later, while working at Indian Space Research Organization (ISRO), I could easily identify that I can ace at Systems Engineering and thus had strong inclination to formally learn, grow and apply myself in the domain. After exploring the MS degree courses available across the globe, I found the curriculum and course structure at ISAE-SUPAERO to be best suited for my requirements. It is a one-year course covering Systems Engineering and MBSE with a primary basis in aviation and space sectors; majority of the tenure is dedicated to learning through application; lecturers are drawn from industry; alumni network of ISAE-SUPAERO is very strong; and definitely ISAE-SUPAERO is one of the top institutes in aerospace studies and research. All of these factors made ISAE-SUPAERO my obvious choice.

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

First of all, I strongly believe that one of the most driving strengths of this Advanced Master is the wealth of cultural diversity. I had the chance to meet and work with people from various countries and continents, to challenge myself with different working methods and most of all to inspire from their diversity and differences.

This Advanced Master clearly offers a high-level academic training resolutely turned towards the needs of the aerospace industry. Indeed, by combining academics approach and technical needs of field, **the SEN Advanced Master offer a great coherence in a transdisciplinary way with concrete study cases and projects.** Furthermore, the speakers' diversity, expertise and passion, provide you with a solid basis and key competences to pursue your career and to strengthen your skills in Systems Engineering.

I find the balance between academic lectures and the practical skill-set taught by lecturers, who have varied and wide industrial experience, as one of the strongest points of this masters at ISAE. All the lectures are augmented by **industrial examples of how different concepts are applied in actual SE practice. Training in different MBSE tools and frameworks was really interesting as well.** Application of what is taught and discussed in the lectures through the course projects and the semester-long Integrated Team Project, provides a very strong foundation for budding Systems Engineers.

Which are your career plans?

I am currently working at CNES the French Space Agency, for MEDES (Space Medicine), as Human Spaceflight and Operation Engineer. I first develop projects and experiments from various universities, scientists and companies for their implementation on board the International Space Station. Then my role is to support in real time the on orbit operations realized by the astronauts..

I will most likely pursue my career in the operational field and more specifically towards Human Spaceflight to become an active part of the challenges that the space exploration offers.

I intend to grow myself as an expert Systems Engineer and Architect, through projects that add significant and sustainable value to humanity, be it in any industry. My background does lure me back to the space industry; nevertheless I am happy to explore a new industry through my internship, and later in future.



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

LANGUAGE REQUIREMENTS FOR ALL MASTERS



(including for Masters taught in French)

TOEFL (IBT) or TOEIC or IELTS

 **88 points**
(Inst. code: 9820)

 **785 points**

 **6.5 points**

or CAE/FCE or Linguaskill

 **170 points**

 **170 points**

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 2021

for a start of classes in September 2022.

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

Application website :

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

Funding

Information on tuitions fees and funding on our website



Your contacts

Philippe GALAUP

Head of recruitment and Contractual Relations
Phone: +33 (5) 61 33 80 27

Caroline ARMANGE

Senior Admission Advisor / Advanced Masters
Phone: + 33 (5) 61 33 80 25

info-masters@isae-superaero.fr

www.isae-superaero.fr