

Institut Supérieur de l'Aéronautique et de l'Espace

ISAE

Thrive for excellence. Passionately



Postgraduate Specialized Masters & Masters of Science



isae 
Institut Supérieur de l'Aéronautique et de l'Espace

2011

 www.isae.fr

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Welcome to ISAE

Are you looking for a top-flight Master of Science (MSc) or Specialized Master's program that will allow you into the passionate world of aeronautics and aerospace? First of all let me introduce ISAE in a few words.

Today, ISAE produces more graduates with engineering and Master's degrees in aerospace and aeronautics than any other institution in Europe. The Institute's reputation is not built just on our prestigious programs, the renown of the faculty staff or the excellence of its research, but also on the quality of our graduates, their technical and managerial skills, their ability to work in an advanced high-tech sector, their entrepreneurial spirit and their international openness.

Our programs are taught on the SUPAERO campus or on the premises of our educational partners selected for their expertise. Classes are taught by permanent ISAE faculty staff and a unique network of several hundred affiliate lecturers from research centers, European aerospace companies. Project work is a major part of our programs, whether they are completed in our research labs or in ISAE partner companies. In this way we can guarantee our students training that constantly progresses

and is always adapted to the needs of businesses. Our internships and careers office proposes customized care to students and assists in building their professional projects, helping them to integrate the professional world.

Today, over one third of ISAE graduates are not French. On the Supaero campus, in the heart of the scientific complex in Toulouse, our 1,500 students on the SUPAERO, ENSICA, Master of Science, Specialized Master or PhD programs are immersed in an international environment that is unique in Europe. Tomorrow, they will be the leaders of the international aerospace industries. Here they will create connections that will continue to develop throughout the ISAE graduate network, which spreads all over the world and is managed by the alumni association.

We have an ambition to propose to you: combine excellence with passion and choose ISAE. We hope to share this passion with you as you enroll in one of our programs in late 2010.

Didier Delorme

Director of Master's and Specialized Master's programs

Masters of Science and Postgraduate Specialized Masters: ISAE, an international post-graduate institute

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. As a higher education and research institute under the trusteeship of the Ministry of Defence, ISAE becomes the new reference in Europe for Aeronautics and Space engineering or related sciences. 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.

Mastère spécialisé (Postgraduate Specialized Master)

The "Mastère Spécialisé" is a collective trademark owned by the «Conférence des Grandes Ecoles», given to specific training programs organized by one of the «Ecoles» that is a member of the Conference. The highly rigorous accreditation process ensures the outstanding excellence of the training programs over the course of the studies.

Postgraduate Specialized Master is a one-year course of advanced studies, professionally-oriented, undertaken after master's studies. Specialized Masters delivered by ISAE provide attendees with unique up-to-date knowledge and know-how in a specific domain for which aeronautics or space companies have a genuine need. Courses are given by specialists or experts from industry or state organisations completed by ISAE's professors. ISAE's Specialized Masters merge theoretical lectures, tutorials, case studies and personal projects to prepare attendees with aerospace system approaches. Being attentive to the aerospace global market needs, the worldwide enrolment of attendees with a wide range of qualifications, profiles, cultures and professional experiences offer an outstanding opportunity to develop international personal skills and strengthen employment capabilities after graduation.

ISAE's Specialized Masters allow students to acquire:

- in-depth and advanced knowledge in professional area,
- dual competency,
- professional skills related to an emerging function.

6 main reasons to choose an ISAE's master

- Give aerospace passion reality through high standard training programs
- Access to advanced research domains contributing to education in science and technology
- Take advantages of ISAE's well-known experts from industry or research centers
- Strong and permanent exposure to European leading aerospace companies
- Share international experience in the European aerospace capital
- Access to the ISAE's alumni network of 17000 graduates around the world

Diplôme National de Master (DNM) Master of Science

DNM or Master of Science is a two-year degree undertaken after undergraduate studies, Bachelor's degrees or equivalent. It provides higher qualification for employment or prepares for doctoral studies. The DNM is accredited by the Ministry of Higher Education and Research in line with the Bologna process established in 1999 to harmonize the European higher education systems by making academic degree standards and quality assurance standards more comparable and compatible throughout Europe.

The two-year Masters of Science of ISAE are to be considered as innovative programs in science and technologies and are becoming well-known amongst international Masters of Science worldwide. ISAE's Masters aim to educate future engineers to respond effectively and rapidly to demanding needs of the aerospace industry. They are designed with a combination of lectures, personal project and assignments, and thesis projects performed in industrial environment or in ISAE's laboratories.

Fully taught in English, they are particularly suitable for students with a bachelor's degree in mechanical, electrical, mechatronics, aeronautics or aerospace background.

Interweaving the teaching of both masters, ISAE wishes several options to enable graduates envisaging their professional career with confidence in accordance with their wishes and interests.

Aeronautical Maintenance and Support

Accredited by the Conférence des Grandes Écoles



Aims

The global and booming aviation market is characterized by low volumes, highly complex products with long lifecycles and high values, governed by restrictive regulatory requirements, with constant safety concerns and with a huge growth in the aircraft maintenance, repair and overhaul business (MRO). MRO plays a key role for defence and aviation industry encompassing a wide range of complex activities: engine overhaul, heavy checks, line maintenance, component maintenance, and major airframe modifications. Through regular maintenance, MRO ensures the continued airworthiness and operational safety of aircraft, and therefore the safety of passengers. Beyond, it ensures aircrafts meet the rigorous certification, safety, or standards set by international authorities such as ICAO, EASA and FAA.

Today, the aviation industry is facing tremendous challenges. To compete, aviation companies in all segments must strengthen their ability to increase productivity and production rates with products and services that meet customer demands, with a focus on continuous critical assessment of cost and performance. So, the continued support for MRO is an intrinsic part of aeronautical and maintenance manager, including service lifecycle management, service organizations, configuration management, reducing costs and improving service quality.

The objectives of the Master in Aeronautical Maintenance and Support are to provide students with up-to-date exposure to

modern techniques and methods, know-how, regulations and standards applied in aviation industry, putting the emphasis on life cycle cost management making services more profitable, available and reliable.

The master SM AMS aims at providing a wide range of knowledge from engineering basics to management of maintenance organisation in the respect of international regulations within Integrated Logistics Support methods. Merging academic teachings, up-to-date ILS and Maintenance concepts delivered by experts from industry and authorities, it prepares attendees to face, successfully, the competitive and fast changing MRO worldwide business.

With the Master in Aeronautical Maintenance and Support, ISAE has made a significant improvement to answer to the current needs of manufacturers, design offices and customers support departments, airlines, MRO and authorities. SM AMS is the only one in Europe which addresses both Maintenance and Integrated Logistics Support for civil and military aviation business in an integrated program.

Organization

Head of Program: Didier DELORME

E-mail: didier.delorme@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 courses from September to March.

More than 500 h of lectures, tutorials, practical sessions, CAD, visits of industries (AIRBUS, EADS Sogerma, Liebherr Aerospace, CEAT, etc.).

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.

Teaching staff

Teaching staff is composed of ISAE's permanent professors and experts from aerospace and aviation industry with aeronautical industrial background (Airbus, Air-France, AIA, CEAT, EADS, Turboméca, Safran, EADS Sogerma, Sogitec, etc.) or from airworthiness authorities (Bureau Veritas, DGAC) related to maintenance vouch for the quality of teaching dispensed.

Syllabus

Introducing Integrated Logistics Support concepts, definitions and tools, the SM AMS syllabus offers a comprehensive teaching program with 2 options: structure, avionics. Beyond the two options, the program makes a focus on ILS to meet requirements and interests of the aviation Industry.

Part 1 - Common program - 85 h

Fundamentals

CAD, Sensors and measuring systems, Control, Thermo propulsion, Flight dynamics

Part 2 - Aircraft knowledge - 125 h

Aircraft and airframe architecture, Airframe-linked systems, Avionics systems, Data transmission, Engine propulsion

Part 3 - Options

Option 3.1: Structure major - 247 h

Composites materials, Aeronautical materials, Fatigue, Aeronautical structures, NDT

Option 3.2: Avionics major - 282 h

CAD, Signal processing, Electrical engineering, Data transmission, Avionics systems, Automatic equipment tests

Part 4 - Maintenance and ILS (common program) - 353 h

Integrated logistics support, ILS-military aircrafts, Maintainability, Influence on design, ILS civil aviation, Quality, Reliability-Maintenability, Safety analysis, Maintenance methodology, Maintenance of military aircrafts, Development and evolution of a maintenance program, Organisation of a maintenance department (Airlines), Maintenance industrial strategy (Airlines), Managing a maintenance department (MRO, small airlines), Spare parts management, Air law and technical regulations (inc. airworthiness), Etops flights, Documentation, MCO, Customer support, Recycling and maintenance of aircrafts, Engines and propulsion systems maintenance, Avionics and systems trouble shooting maintenance, Help for onboard Maintenance

Career opportunities

It is intended to students who envisage management position in aircraft manufacturers, airlines, and MRO organisations on civil market or military forces.

Companies recruiting our students

AIRBUS, Aeroconseil, Air France, DGAC, Liebherr Aerospace, Safran-Snecma, Safran-Turbomeca, Mecachrome Canada, Embraer (Brazil), Hal (India), Lan Chile (Chile), Lot (Poland), PZL Swidnik (Poland), Portugal Air Force, Singapore Air Force, South Africa Airways, Denel (South Africa), SONAIR (Angola), Tunisair, Royal Air Maroc, China Airlines (Taiwan), Taiwan Air Force, COMAC (China), AVIC (China), Sh&E: International air transport consultancy (USA).



Witness

Arun Venkadesh SELVARAJ, Graduated in 2008

« I was lucky in the sense that I have found ISAE to do my Master's in aeronautical maintenance as it is one of the reputed university in Europe which helps the students to enter into the fast growing Aviation Industry in this modern world. The appealing factor of my university is its course contents and its best labs which are really advanced and well-equipped. The theoretical knowledge that I gained through different professional experts from the aviation industries and the practical knowledge obtained from my internship during the end of my course helped me to get placed as "Responsable Bureau Technique" in MAT AVIATION, Helicopters Maintenance, Repair and Overhaul station near Paris, taking in charge of preparing maintenance program and continued airworthiness of a fleet of aircrafts.»

Aviation Safety Aircraft Airworthiness (ISAE-ENAC-EA)

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Aims

Aircraft airworthiness must be considered as a coherent process running from the design of the aircraft to the monitoring of its technical condition in airline service. The Master in Aviation Safety – Aircraft Airworthiness covers both the technical aspects of certification and the legal and economic implications. This course has been designed to give future managers a broad understanding of the issues and priorities which, as far as aeronautical construction is concerned, have an international dimension.

Air transport deregulation and the development of a global economy necessarily imply an increase in vigilance on behalf of both the regulatory authorities and the industry. Progress regarding safety has been constant. During the last 30 years, the accident rate per flight hour has been reduced by a factor of 10. This is becoming insufficient due to the considerable increase in traffic. Current trends should encourage us to make even more improvements, and this necessarily involves trainings. The Master in Aviation Safety Aircraft Airworthiness will provide future operators with the key to success in times to come.

In 2010, Ecole de l'Air (EA) which is the French Air Force Academy has joined ENAC and ISAE and will deliver course in the domain of the airworthiness of governmental aircrafts with focus on civil and military concerns.

Organization

Head of Program ISAE: Didier DELORME

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Head of Program ENAC: Claude HAILLOT

E-mail: claud.haillot@enac.fr

Duration of studies: One year full time

Beginning of classes: September

Location: ISAE, Campus SUPAERO from September to November; ENAC, & École de l'Air (EA - Salon de Provence) from December to March

Teaching language: English

Pedagogical approach

First semester: academic session of 18 courses from September to March, provided by permanent professors of ISAE, ENAC & EA and experts from aerospace industry giving their current knowledge and experience, including: lectures, tutorials, Practical sessions, visits of industries (Airbus, CEAT, etc.).

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 or ENAC. The thesis is concluded by the preparation of a report and an oral dissertation in front of jury.

Syllabus

Part 1: Aeronautical techniques and study of the aircraft - 8 courses at ISAE - 241 h

- The flight envelope
- Structural operating limitations
- Aeroplane architecture and stress calculation
- Propulsion
- Avionics part 1
- Avionics part 2
- Aircraft systems
- Qualification tests for civil aviation on board equipment and systems



Part 2: Air Transport safety - 8 courses at ENAC - 300 h

- Certification in international air transport
- Safety of complex systems
- On-board software
- Air transport safety and human factors
- Quality approval and concept
- Operational procedures
- Maintenance procedures
- Continuing airworthiness

Part 3: Airworthiness at EA (Salon de Provence) - 60 h

- Airworthiness of governmental aircrafts

Career opportunities

This Master prepares students to a various job either in aircraft manufacturers, or in civil Aviation authorities and Airlines: airworthiness inspectors, certification managers, Airworthiness follow up, etc.

Companies recruiting our students

Airbus, EADS, Aeroconseil, Eurocopter, Safran-Turbomeca, Civil Aviation Authorities of Algeria, of South Africa, of China, of Colombia, of Malaysia, DGAC (Civil Aviation Authority of France), Malaysian Air Force, French Ministry of Defence, Venezuelan Ministry of Defence, Royal Air Force of Oman, South Africa Airways, Embraer (Brazil), Hal (India), SONAIR (Angola), AVIC (China)

Witness

Prajyoth Krishna Mirajkar, New Zealand, SM ASAA, Graduated in 2010

« Having completed my studies at the University of Sydney, I was in search of the next progression in my career to advance myself in the aeronautical domain.

There was one course that clearly stood out from the other post-graduate opportunities that were available to me, and it was this Master in Aviation Safety and Aircraft Airworthiness. Safety and Airworthiness are the two most important concerns in the aviation industry today, and there is clearly a growing demand from industry for students who have undertaken this course.

This master is shared by both ISAE and ENAC which are two of the most prestigious aeronautical universities with a solid reputation around the world. They are very well established and the fact that they are located in Toulouse at the epicentre of the aerospace industry gives them a superior advantage in terms of proximity and providing strong industry links. This also meant that most of our lecturers were industry experts in their given fields and everything we learnt was using real life examples in today's aviation domain. The technical knowledge at ISAE and the certification competency at ENAC combined with visits to world leading manufacturing plants and firms provided the perfect balance to give us a well rounded approach to gain a high level of education in the Masters program.

I have proudly and successfully completed my Thesis in the Airworthiness Technical Directorate at Airbus, where I am currently employed. I highly recommend this Masters, it is the best decision I have taken to further my career and it has opened up a world of opportunities».

Embedded Systems (ISAE-ENSEEIH)

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Aims

Toulouse has one of the greatest concentrations of Embedded Systems industry in Europe with the major aerospace and equipment manufacturers working either for the aeronautical, space or car industry, including Airbus, CNES, Astrium, Continental, Thalès, etc. Embedded Systems have become essential in several kinds of product in daily life. Embedded Systems encompass a broad class of systems and are actively involved in all domains, from transport systems (aeronautics, space, road, rail and sea), to energy sectors (e.g. nuclear and chemical) and also to communication systems (e.g. mobile phones and PDAs).

The Embedded Systems Master Program is a one-year professional course, designed by the ENSEEIHT and ISAE partners, with the support of the embedded systems industry.

Aware of the real need for a multidisciplinary approach, the program prepares students with in-depth and comprehensive knowledge of the underlying technologies involved in embedded systems. The program focuses on both theoretical and concrete aspects. It aims at:

- developing competencies, at system level design for the development of Embedded-Systems, based on strong basics of complementary subjects, such as electronics, computer science, energy conversion and management, automatic control, telecommunications and networks,
- developing the system approach through integrated projects to Master specific methods and tools applied to the following domains: aeronautics, space, automobile or multimedia.

The training for this Master's degree is multidisciplinary. It covers all hardware, software and control issues of Embedded Systems within an integrated system based perspective.

Organization

Heads of Program:

- Prof. Janette CARDOSO
E-mail: janette.cardoso@isae.fr
- Prof Jérôme HUGUES
E-mail: jerome.hugues@isae.fr



→ Prof. Jean-Luc SCHARBARG

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Duration of studies: One year full time

Beginning of classes: September

Location: ISAE, campus SUPAERO and ENSEEIHT

Teaching language: English

Pedagogical approach

First semester: an academic session of around 360 h, provided by permanent professors of ISAE and ENSEEIHT and experts from industry bringing current knowledge and experience, including: lectures, tutorials, and labs, a multidisciplinary project of 75 h that aims at integrating the academic session into an industrial case study.

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 or ENSEEIHT. Thesis is concluded by the preparation of a report and an oral dissertation in front of jury.

Syllabus

Embedded Systems require collaborative training approach with a broad spectrum interweaving experts from all concerned fields: electronics, energy, computer science, networks and control systems.

The academic session of the Master program consists of a 550-hour program covering the five disciplinary fields while focusing on the architectural aspect:

Initial Part - Standardisation - 23 h

Laplace and Fourier Transformers, Transfer functions, frequency response, basic principles of stability, Analogic and digital electronic circuits, Distributed circuits and transmission wires, Physical principles of energy conversion, Computer based operations

Part 1 - Computer science - 52 h

Real time language, Architecture description language, Real time operational systems

Part 2 - Control systems - 56 h

Design and Validation of DES, Feedback Control, Signal Processing

Part 3 - Electronics - 70 h

Digital representation of analog signal, Microprocessor and DSP architecture, Architecture and conception of digital integrated systems, Hardware and software co-design, Emission/Reception architecture

Part 4 - Energy - 58 h

Actuator and converter control, Electromechanical and static energy converters, Autonomous energetic systems, Embedded electrical network

Part 5 - Networks - 56 h

Embedded networks: an introduction, Specific buses and networks, Real time networks, Design and validation of real time protocols, Architecture of fault-tolerant buses

Part 6 - Embedded systems engineering - Applications - 58 h

Real time control of a space system, Hybrid Systems, System Engineering, Real time control of a mechatronics system, Networked control systems

Part 7 - Embedded systems engineering - Courses - 100 h

System Dependability, Certification, Computer Safety, Optimization, Electromagnetic compatibility, Mechatronics integration

Part 8 - ISAE Information system user - Introduction - 2,5 h

Part 9 - Multi-disciplinary project - 75 h

Career opportunities

Embedded Systems offer challenging career opportunities. The Master is designed either for young graduates or more experienced engineers, who require a postgraduate program to enhance their technical and management skills. This Master concerns any industrial sectors where embedded systems are used: aeronautics, space, road, rail and sea, energy industry, communication systems, etc.

Career opportunities in this area are numerous and are growing in a variety of large and small companies. This Embedded Systems Master qualifies our students for employment as designers, developers, research engineers including project managers in design and development of innovative embedded systems. Jobs in consulting companies are also accessible after graduation in this domain.

Witness

Sandeep Joshi, India, Graduated in 2010,

My experience with ISAE and Toulouse is something I would cherish for a long time. When I first got an admit from ISAE I was a little bit hesitant about accepting the admit as I had a perception that it will be impossible to manage in France without good knowledge of French and I did not know a single word of French when I got the admit. However, I decided to take up the challenge and as if to support my decision I was also selected for the prestigious Thales academia scholarship. I took-up a course in basic French @ the Alliance Francaise Bangalore, which helped to a certain extent during my early days in France. Coming to the course itself, it has a good blend of hardware and software modules along with other interdisciplinary modules. The best part of the course was the practical (lab) work which provides a better understanding of the concept. Also since the time allocated for these lab sessions is short one has to make effective utilization of every minute in the lab. Every lab session is evaluated with a report which again helps the students to improve their writing and analytical skills. The course involves extensive use of tools like MATLAB, Simulink, Windriver Workbench and Xilinx ISE which is an added advantage in the job market.

Finally, working in tandem and competing with the students from France made me improve my analytical and time-management skills. Overall, it was a good multi-lingual and multi-cultural experience.

Last but not the least, Toulouse is a nice peaceful city with friendly people and a lot of Aerospace Research organizations, which makes it an ideal place for study. I'm extremely thankful to Thales, French Ministry and ISAE for sponsoring my course and giving me an opportunity to sharpen my professional and academic skills».

Earth Remote Sensing and Observation Systems

Accredited by the Conférence des Grandes Écoles



Aims

The ERSOS (Earth Remote Sensing and Observation Systems) Specialized Master is a one-year professional degree course. Our goal is to deliver an international program in the field of Remote Sensing and Observation Systems. ERSOS aims to develop cutting edge (scientific) skills and competencies in every stage of the image chain, from the earth's surface to remotely sensed data products: systems (satellites, etc.), scientific skills (earth remote sensing, image processing, data analysis, etc), technological sensors (satellite sensors, cameras, 3D, RADAR, lidar, microwaves, etc) and international project management. The spectrum of applications is very wide and related to numerous domains. It can be divided into three areas: Environmental issues (oceanography, sustainable development, forest and water management, etc.), Civil issues (GIS, Cartography, etc.) and Safety & Security.

Organization

Head of Program: Prof. Emmanuel Zenou

E-mail: emmanuel.zenou@isae.fr

Duration of studies: One year full time

Beginning of classes: September

Location: ISAE Campus SUPAERO, Toulouse, France

Teaching language: English

Pedagogical approach

First semester: academic session of courses from September to March.

More than 430 hrs of lectures, tutorials, practical sessions, and conferences in the field of earth observation.

Second semester: students conduct a professional thesis within an aerospace company, organization or laboratory in France or abroad. They are supervised by a tutor from the host organization and from ISAE.

Teaching staff

The teaching staff is composed of ISAE's permanent professors and experts from Industries (EADS-Astrium, Infoterra, Spot Image, C-S, etc.), Institutions (CNES, etc.) and research centers (INRIA, ONERA, OMP, etc.) all related to Earth Observation Systems.

Syllabus (New program 2010 - 2011)

ERSOS Specialized Master courses improve scientific and technical knowledge and skills from the scene to information, via observation systems. The syllabus includes five parts:

Part 1 - Systems - 55 hrs

Image quality, satellite system, mission analysis, geographical information systems

Part 2 - Remote sensing and sensors - 80 hrs

Remote sensing, optical sensors, RADAR sensors, 3D



Part 3 - Image analysis and data analysis - 110 hrs

Computer vision, optimization, advanced techniques in space imaging, data analysis

Part 4 - Applications- 95 hrs

Applications are divided into:

- environmental issues,
- civil issues,
- and military issues.

Application domains are: climatology and meteorology; oceanography; sustainable land management; forest, vegetation and agriculture; hydrology and water cycle; cartography and DEM; natural disasters; military environment.

Part 5 - Project - 90 hrs

Industrial or research project (including project management and system engineering), visits and seminars.

Career opportunities

The ERSOS Specialized Master Program leads students to applied technical engineering, research engineering, consulting or management in the fields of image and data processing, sustainable development, space systems, etc.



Helicopter Engineering (ISAE-Eurocopter)

Accredited by the Conférence des Grandes Écoles



Aims

The Master Helicopter Engineering is designed for graduates or professionals having a passion for this specific aircraft. Developed by ISAE and Eurocopter -global helicopter manufacturer and market leader, this 2-semester program provides high-level of engineering and technical competences for careers in helicopter business world. Unique worldwide, the Master Helicopter Engineering takes singular advantages from the marriage of the both teaching approaches that allows attendees well balanced mix acquisition of scientific and engineering knowledge, as well as techniques and technologies from the world leading company. This comprehensive program course starts with basic engineering knowledge in aeronautical design, then emphasizes on specific techniques, technologies or management aspect related to the design, certification and operations of civil or military helicopters.

Organization

Head of Program: Prof. Frédéric LACHAUD

E-mail: frederic.lachaud@isae.fr

Duration of studies: One year full time

Beginning of classes: September

Location: ISAE, Campus SUPAERO from September to December, Eurocopter premises (Marignane) from January to February

Teaching language: English

Pedagogical approach

First semester: academic session of about 530 hours of teaching from September to March, provided by permanent professors of ISAE and experts from aerospace industry giving their current knowledge and experience, from the helicopter industry (Eurocopter, Safran/Turbomeca, Thales, etc.). Including: lectures, tutorials, and practical sessions.

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

ISAE part 1 - Aerospace Engineering - 112 h

The aeronautical engineering environment – Aeronautical products – Aeronautics – Propulsion – CAD – Aircraft structure – Composites – Modelling of aeronautical structures – Advanced structures dynamics – Materials for aerospace structures – Integrated Team Project

ISAE part 2 - Helicopter Engineering - 200 h

Vibration model analysis – Helicopter propulsion and motorization – Helicopter equipment – Arming - mission – Helicopter in flight tests – Certification – Helicopter maintenance

EUROCOPTER part 3 - Organized at Eurocopter premises (Marignane) - 163 h

Aerodynamics -flight qualities- Performance – Helicopter dynamics – Helicopter construction materials and techniques –Systems – Prototypes – tests – production – Quality assurance

Career opportunities

This programme prepares attendees to a wide range of professional opportunities from design, certification and operations of civil and military aircraft in France and overseas.

Companies recruiting our students

Eurocopter, Safran-Turbomeca, Thales, AVIC (China) Helibras (Brazil), HAL (India),Eurocopter Mexico, Air Force of Algeria, Navy of Brazil, Air Force of Chile, Air Force of India, Pakistan Army, Air Force of Tunisia, SONAIR (Angola)



Witnesses

Alix ANDRIEU, Flight Test engineer Eurocopter, graduated in 2008

« During my graduate studies at aeronautical engineer school, my dream was to learn about helicopter however all lessons had been on airplane so I couldn't have theoretical lessons on helicopter working. So I inquired about possible postgraduate courses in other engineering schools or universities and I found this Specialized Master in Europe at ISAE. After 5 years of study I wanted to start my first job but the Master was the only way to fill my wish to work in Helicopter industry. So I applied for and I could do it.

Thanks to this Master I discovered the helicopter world. This Master gathers all fields regarding helicopter. That means materials, design, avionic, arming, aerodynamic, vibration, systems, flight performances, etc.

One of the main assets of this Master is the involvement of Eurocopter. Parts of lectures are taught by engineers, providing me with their expertise, giving as well a perception of the working of company and different existing jobs.

Now I am working in this leader company of helicopter conception and manufacturing. I joined the flight test department after graduation in September 2008.

After I have been studying this Master program for one year, I could say I feel being a better engineer than without do it».

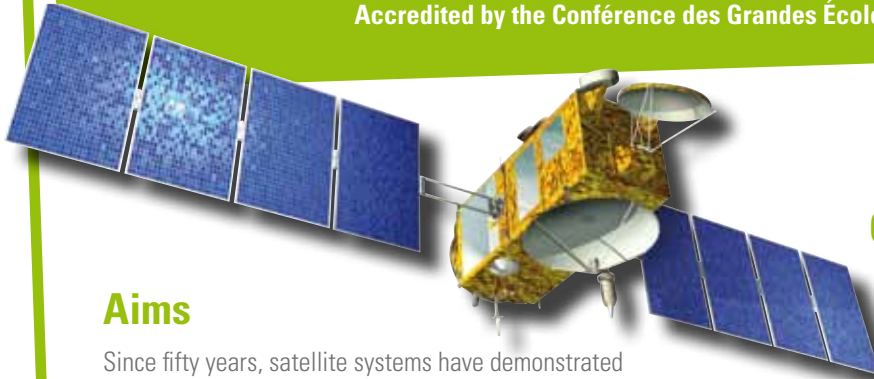
Marc Lambelin, Light Helicopter Quality Program engineer, Eurocopter, Graduated in 2006

« With a solid background as pilot of helicopters, I decided to come back to the engineering domain with my final target that is to work as flight test engineer. To reach this goal and to live completely my passion, I decided to apply to the Master of ISAE - ENSICA which is the unique professional-oriented Master offering a comprehensive program from design, development, manufacturing and operation of helicopter. It offered me the best opportunity to acquire necessary professional skills in engineering, techniques applied to the Helicopter area, in addition to my previous pilot experience. I realized my objectives; I now work at EUROCOPTER, as Light Helicopter Quality Program engineer. It's the first step before next evolution».

Space Communication Systems

(ISAE, ENSEEIHT, TELECOM Bretagne, TELECOM SudParis)

Accredited by the Conférence des Grandes Écoles



Aims

Since fifty years, satellite systems have demonstrated their excellence to collect and distribute data in a vast coverage area for the benefit of thousands of users. While space communication is a niche market within the global telecommunications business, it displays one of the most profitable space applications in permanent evolution. Companies of the sector, both system and service providers, are constantly looking for junior executives offering the expertise matching the specifics of space communication.

The Space Communication Systems programme is tailored to provide students with necessary and up-to-date knowledge for mastering different aspects of digital communications, signal processing, and networking applied to communication or navigation systems. Such systems are strategic in aeronautical or space applications.

The programme is built upon on the following principles:

- ➔ give a global approach of system design and analysis by taking into account the environments, the limitations and the constraints, the interfaces and the expected performances,
- ➔ develop expertise in the disciplines contributing to the design of these systems: signal processing, digital communications, networking, etc.
- ➔ acquire and master design and simulation tools and techniques of the field,
- ➔ get acquainted with the development of applications for the space, aeronautical and embedded-system domains.

Organization

Heads of Program:

➔ Prof. Marie-Laure BOUCHERET

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

➔ Prof. Michel BOUSQUET

E-mail: michel.bousquet@isae.fr

➔ Dr Laurent FRANCK

E-mail: laurent.franck@telecom-bretagne.eu

Duration of studies: One year full time

Beginning of classes: September

Location: ISAE, Campus SUPAERO and ENSEEIHT

Pedagogical approach

First semester: academic session of around 400h, provided by ENSEEIHT, TELECOM Bretagne 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 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, ENSEEIHT or TELECOM Bretagne. The thesis is concluded by the preparation of a report and an oral dissertation in front of jury.

Syllabus

Part 1 - Project management - 20 h

Part 2 -Basics - 159 h

Signal processing and source coding, Digital communications, Spread spectrum techniques, Coding applied to the satellite channel, Basics on networks, Network simulation tools, Antennas and microwaves components, Integrated electronics, Project

Part 3 - Systems and specific techniques - 182 h

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 digital receivers, Navigation digital receivers, Ground stations and terminals, Project

Part 4 - Applications - 140 h

Satellite based computer networks, Embedded-networks, Mobile communications and multimedia
Legal and economic aspects, Overview of space systems applications, Integrated Team Project

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, DSN, DLR, ESA, Algerian Space Agency
- ➔ Consulting groups: M3 Systems, Altran, France Développement Conseil, etc.

Witnesses

Nacima RACHEDI, Engineer, Algerian Space Agency, Graduated in 2009

« ISAE is for me a famous school where state of art of the space technologies are taught. Knowing that I am planning to build my carrier in that field, it was for me a good opportunity to do my master in this environment. If I can make advice for future students, my first advice is to be able to learn new things, new methods, new skies, never stay in it's own vision, doesn't matter where we are coming from and which school mechanism we use to follow. After that it's question of ambition and willing. This master courses were for me a huge amount of information and methodologies, I gained knowledge that can help me in my work but also touching closely all the modules and doing workshops. I had some experiences that I am sure it will allow me to look further in that field next time when I have to implement some topics during my carrier. After graduation, I will come back home and be appointed as project officer in the Algerian Space Agency».

VENMANI Daniel Philip, India, graduated in 2010

« France, a land of Fashion and food, the land of TGV, is nevertheless inferior in its technology also. And that is the prime reason I opted for France as a destination to do my Masters Studies. France, being one of the leaders in wireless communications with Satellite Communications and Telecommunications, bearing major concerns like the EADS, Thales attracted me to pursue my Masters in Space Communication Systems.

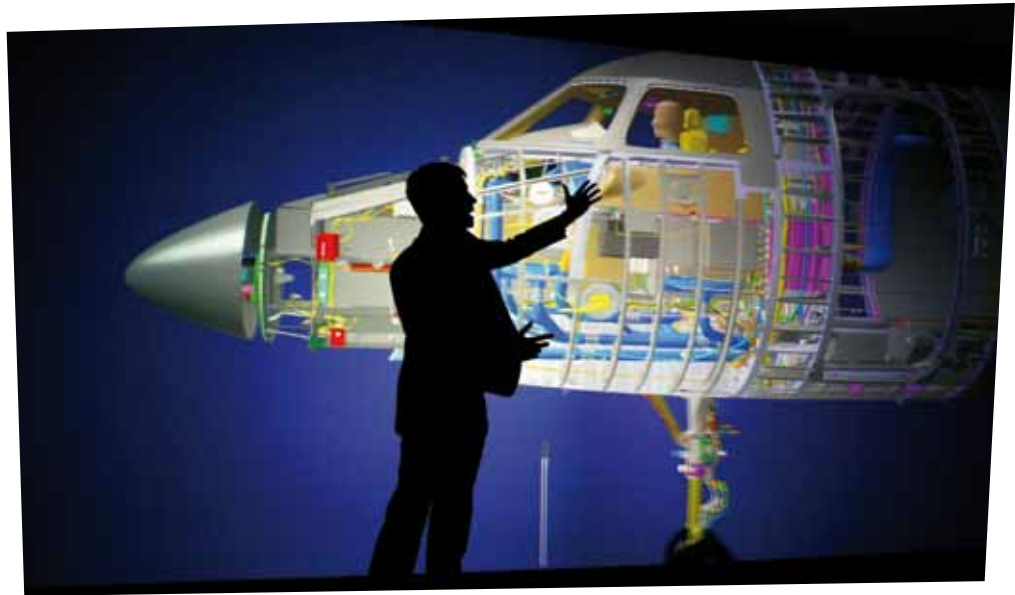
And, to its credit, ISAE is the best place to begin a career in communications, where in numerous research works are being carried out in domains like Ad-Hoc networks, Wireless Networks, Resource Allocation for satellite links, Radio engineering for satellite systems etc.

ISAE, best known for its exclusive training for engineers in the field of Aeronautical Engineering, is no way inferior for Satellite communications as well. Best professors like Marie Laure BOUCHERET, Michel BOUSQUET, Laurent FRANCK are all known for excellent academic and research accomplishments in their respective field. World class Labs that are opened throughout the day, easy access to libraries and above all always-smiling and most willingly helpful staff will make the stay more pleasant.

In short, I could conclude that "ISAE- Not so foreign!" to me, as I have all my motherland feelings inherited in it while studying there! Today, I find myself as a Doctoral Candidate with Orange Labs, thanks to ISAE!»

System Engineering

Accredited by the Conférence des Grandes Écoles



Aims

Systems Engineering is an interdisciplinary field of engineering integrating all disciplines and technologies into integrated team from development, to design, up to operation 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 expecting budget, with the level of quality and performances meeting requirements of an open an competitive market. System 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 System 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. Stéphanie LIZY-DESTREZ

E-mail: stephanie.lizy-destrez@isae.fr

Duration of studies: One year full time

Beginning of classes: September

Location: ISAE, Campus SUPAERO

Teaching language: English

Pedagogical approach

The one-year course is split into 2 semesters in ISAE premises - lectures, integrated team project, etc. - and 4-5 months of internship.

First semester: academic session of around 440h, provided by ISAE's permanent professors and experts from industry bringing current knowledge and experience, including: Lectures, tutorials, industrial study cases. And 130h devoted to the Integrated Team Project run all along the semester.

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

Teaching part (First semester) – 646 h

Part 1: Academics (521h)

ISAE Information System User Introduction
 General Aircraft Technical Overview
 System Engineering Introduction (SEI)
 Project Technical Management (PTM)
 System Engineering Data Technical Management (SEDTM)
 System Modelling and Analysis (SMA)
 System Dependability (SD)
 System Performance Assessment & Management (SPAM)
 Optimise, Decide, Justify, Verify & Validate: The essential system engineer toolbox (ODJVV)
 Requirement Engineering (RE)
 System Design and Architecture (SDA)
 System Assembly, System Integration, System Verification & System Validation (S4AIVV)
 Integrated Logistic Support (ILS)
 Study Case : System Engineering and Certification of the A380 (A380)
 Study Case : System Engineering of Space Systems (SESS)
 Study case : System Engineering at Dassault Aviation (DAV)
 System of systems (SOS)

Part2: Integrated Team Project (ITP) (125h)

Career opportunities

For Students with open mind, who want to Master things generally, who do like working in integrated team, who like challenges, who are convinced that we can have fun while working, this Master will offer huge job opportunities in Systems Engineering.

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 Engineering engineers 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 offer students great opportunity to join Engineering Systems Team within industries in different economic sectors.

Companies recruiting our students

EADS Airbus, Dassault Aviation, EADS Defence and Security System, EADS Astrium, Arianespace, Aéroconseil, Seditec, Altran, Hispano Suiza, Thales Alenia Space

Witness

Tianjiao Li, China, Graduated in 2010

« I am working in Thales China as a PPC (Processing, Computing, Cognitive) Engineer in R&D (Research and Development) after graduated from SEN, one master of ISAE.

My dream was to be an engineer since my childhood, so I chose aeronautics as my major of bachelor. After four-year study, I was lost in so much technical issues and mathematics and physics quotations. I want to be an all round person in my career path, who is not only good at technical issues but also adequate to marketing, sales, product application etc. Therefore I was desirable to study System Engineering which integrates all the disciplines and specialty groups into a team effort forming a structured development process that proceeds from concept to production to operation.

I was so luck to be accepted by ISAE, whose academic environment is so professional and the faculties are so responsible. In SEN, I learned the practical knowledge given by the professional teachers who are long years in the industry. The teachers are from each domain, who taught us by the easily understandable ways with their rich experience. All the topics were cutting edge in industry, which are innovative and interesting. Besides that, I loved so much of the atmosphere of SEN, where the friendships were very strong. People from different countries always helped each other and so many exotic dinners held by classmates enhanced my knowledge of international courtesy and custom. In SEN, I was getting more and more open-minded, active and motivated, which are the most important in one's career.

After graduated from SEN, I was recommended to Thales China by my Thales Academia tutor. Thanks to ISAE and Thales Academia Programme, I am on my preferred career path now and hope the future students of ISAE will have a brilliant career».

Aeronautical Engineering

with a Flight Test Engineering option
Accredited by the Conférence des Grandes Écoles



Aims

The specialized master TAS Aero program leads to a one-year professionally-oriented master's degree with an emphasis on Aerospace Engineering (AE). For some students having a passion for the flight testing, the master TAS Aero offers a Flight Test Engineering major (TAS Aero – FTE).

The SM TAS Aero allows students to develop a high level of competence in engineering science, current technology, engineering design and management of aeronautical systems, or flight test performances. The TAS - Aero programs are highly multidisciplinary and aimed at developing engineering skills to easily enter the work world with great opportunities and significant chances of advancement on aeronautical projects, either in a research facility or in a company in a multinational environment.

The programs are specially designed for students starting immediately after the completion of their master 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 an integrated approach of the product design development, while acquiring necessary skills in the disciplines and techniques of the aeronautical sector,
- to easily work on multidisciplinary projects in aeronautics with a very practical approach,
- to develop skills in team building and team process at a multinational level,
- to develop project-management and programme management skills for international use,
- to understand the global economic environment of the aeronautical sector.

In 2011, a new major is open in Flight Test Engineering. The focus of this major – TAS Aero – FTE, is on the more applicable concerns of the subject which will be encountered during the development and certification of new aircraft, by manufacturers of aircraft or equipments.

This major TAS Aero – FTE is aimed at engineers entering this exciting field with little or no prior experience of the subject, and those whose work in other branches of aeronautics requires them to have an appreciation of the issues involved. Graduates of this master are capable of working in flight test department to contribute to various flight testing (certification tests, envelope expansion, performances, handling qualities and aircraft systems...)

Organization

Heads of Program:

→ Prof. Alain LACOMBE

E-mail: alain.lacombe@isae.fr

→ Christian COLONGO

E-mail: christian.colongo@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 350h, provided by ISAE's permanent professors and experts from aerospace industry bringing current knowledge and experience, including:

- lectures, exercises,
- labs with Matlab,
- engineering and design study seminars,
- laboratory sessions,
- written report and oral presentation,
- practical sessions,
- team work and team business game,
- in-flight practical study and industrial visits (Airbus, CEAT, etc.).

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.

Witness

Sabine MALTAVERNE, France, graduated in 2009, is now working at Snecma located in Gennevilliers, as engineer.

Why did you choose ISAE for your specialized master?

«Only ISAE proposes a specialized master in aeronautics which relates to technical subjects rather than business. Master courses took place at the SUPAERO campus. This allows us to enjoy its famous status.

What advice would you give to someone considering the course in order to succeed in their studies?»

«To take into account all the courses, work on the exams given during the years before, work with people of the engineer cycle and resist to the stress».

What has the course brought you, what have you gained through the master s' course?

«I improved my experience concerning general courses and I got a first theoretical teaching in the aeronautics field».

Has the master TAS Aero helped you in your current or past job?

«Of course. The specialized master is responsible for my presence in Eurocopter. In this company, my work begins rapidly because of helicopters' courses that I followed at ISAE. I got self-confidence to propose ideas and guidelines in a project frame because of the many examples studied during specialized master. Furthermore, I can deal more easily with theoretical aspects».

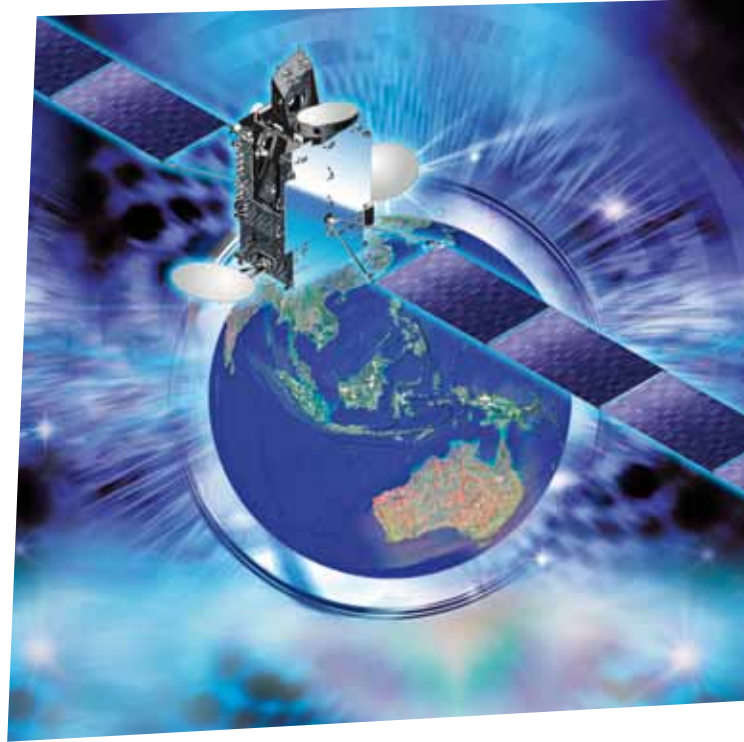
Syllabus structure

Detailed Program	Hour	TAS Aero - AE	TAS Aero - FTE
ISAE Information System User Introduction	2,50	X	X
STRUCTURES			
Structures standardisation	7,50	X	
MATLAB standardisation	5,00	X	X
Aircraft Structures	46,25	X	X
Composites Standardisation	2,50	X	X
Composites	18,75	X	X
Modeling for aeronautical structures	21,25	X	
Materials for Aerospace structures	22,50	X	X
Computer Aided Design (CAD)	18,75	X	X
FLIGHT TECHNIQUES			
Aircraft Techniques	28,75	X	X
Flight Dynamics 1	33,75	X	X
Flight Dynamics 2	22,50	X	X
Helicopters	22,50	X	X
Control and avionics	28,75	X	X
AERODYNAMICS and PROPULSION			
Aerodynamics 1	23,75	X	X
Aerodynamics 2	17,50	X	X
Propulsion	26,25	X	X
AERONAUTICAL PRODUCT DESIGN			
Aeronautical Engineering environnement	21,25	X	
Mastery of Aeronautical Products	38,75	X	
Integrated Team Project	23,75	X	

ELECTIVE LECTURES : 1 of 2 to be chosen				
Advanced Structural Dynamics	21,25	X		
Propulsion 2	20,00	X		
Aviation regulations CS/FAR 23 & 25	5,00		X	
Flight test technics and methods	21,15		X	
Human factors in aeronautics	11,00		X	
Flight test experimentation			X	Airplane
Flight test general presentation	6,15		X	
Pitot static calibration, cruise performance	2,30		X	TB20
Tower fly-by	2,30		X	DR400
Climb performances	2,30		X	DR400
Controllability Maneuverability	5,45		X	TB20
Static and dynamic stability	1,15		X	
Longitudinal static and dynamic stability	3,45		X	TB20
Elevator force in maneuver, maneuvering stability	3,45		X	TB20
Lateral and directional static and dynamic stability	3,45		X	TB20
Lateral coefficients identification (telemetry)	1,25		X	TB20
Engine failure	5,00		X	CASA 212
Stall and spin	5,00		X	TB20
Spin demonstration	3,45		X	CAP 10
Spin demonstration (telemetry)	0,30		X	PC7 Pilatus
Acceptance flight	4,45		X	TB20
Team project				
Elaboration of a flight test program	15,00		X	
Evaluation flight	1,30		X	TB20

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».

Experimental Flight Test Engineering (ISAE, EPNER - the French Flight Test School)

Accredited by the Conférence des Grandes Écoles



Aims

Under the aegis of the DGA, ISAE and EPNER joined their expertise setting up the first Master's degree in Flight Test Engineering for pilots and engineers using the synergy of their recognized competences in aerospace education.

EPNER is one of the world leader Flight Test School offering high-level courses for Flight Test Pilots and Flight Test Engineers. EPNER offers fixed wing and rotary wing courses for test pilots and engineers.

ISAE and EPNER studied and developed a comprehensive program integrating their competencies and existing courses to provide EPNER flight test courses attendants with a Master's degree Specialized in Experimental Flight Test Engineering of ISAE besides the EPNER qualification.

The Experimental Flight Test Engineering Master is a 12-month course organized by ISAE and EPNER aiming at providing either Flight test Governmental organizations or Aircraft manufacturers with high-qualified test pilots and flight test engineers. Aware of the necessity to conduct flight tests program in close coordination between pilots and engineers, the original spirit of this program is to prepare pilots and engineers to work in integrated team.

The objectives of the Master is to develop theoretical and applied skills of experienced pilots and engineers for the preparation, implementation and report of flight tests either of aircraft or complex embedded-systems, in the best safety conditions. After graduation, these skilled professionals are able to participate to civilian certification of new or modified aircraft, to aircraft or equipment development program, to military acceptance program, either fixed-wing or rotary-wing.

The course is split into two periods:

- 2-month courses in basis sciences and French aeronautical communication skills organised at ISAE-SUPAERO campus, in Toulouse,
- 10-month Experimental Flight Test course, for fixed wing or rotary wing for pilots and engineers, given at EPNER in Istres.

Organization

Head of Program: Prof. Christian COLONGO

E-mail: christian.colongo@isae.fr

Duration of studies: One year full time

Beginning of classes: End of June

Location: ISAE-SUPAERO campus and EPNER-Istres

Teaching language: French

Pedagogical approach

Academic session consists of around 450h of ground and simulators courses, provided by ISAE's and EPNER permanent professors and experts from industry bringing current knowledge and experience.

And around 110 flight hours on more than 20 airplanes for fixed-wing stream and 15 helicopters for the rotary-wing stream.



All along the program, students conduct professional theses, assessment of aircrafts or embedded-systems. These theses are concluded by the preparation of a report and an oral dissertation.

Syllabus

Mathematics
 Flight mechanics
 Automatic control and aircraft control
 Advanced aeronautical French and aeronautical phraseology
 System Engineering Introduction

Safety of flight tests
 Basics of aerospace techniques
 Documentation, procedures applied in flight tests programs
 Performances tests
 Propulsion tests
 Handling tests
 Embedded-systems tests
 Specific test (fixed-wind): flight envelop extension, certification, acceptance, assessment, etc.
 Specific test (fixed-wind): flight envelop extension, specific flights, synthesis activities
 Professional thesis

Career opportunities

The Master intends to prepare skilled professionals, pilots or engineers for:

- ➔ Managers of flight tests implementation, flight envelop extension of aircraft or embedded-systems in close cooperation with design and development offices,
- ➔ Managers of flight tests centres.

Organisms recruiting our students

Flight Test Centres, Air Force, Navy, Army, EADS Germany, BWB Germany, Airbus, Dassault, Eurocopter.

Specialized Masters
in engineering
in French

Witness

CPT Luca S. Parmitano, Air Force Italia, Graduated in 2009

« I was selected by my government for this specialized master which is related to the EPNER test pilot school course. As the master is still taught in French, I wish give advice future students to learn french, it will help in learning the french culture, which in turn will help them to better understand the courses, even when they are in english. Plus, knowing the language will help them enjoy the beautiful city. Regarding my career, let's say the master helped me get my future job: in September 2009, I joined the European Space Agency to start astronaut training».

Électronique et télécommunications aérospatiales

Accrédité par la Conférence des Grandes Écoles



Objectifs

Former les spécialistes de la conception des systèmes électroniques et de télécommunications dans les domaines de l'aéronautique et de l'espace.

Ces systèmes complexes mettent en œuvre des technologies de pointe.

La grande diversité des sciences et techniques concernées impose de maîtriser une vaste palette de disciplines interagissant dans le développement de ces systèmes.

Organisation de la formation

Chef de programme : Prof. Michel BOUSQUET

Courriel : michel.bousquet@isae.fr

Durée : un an à temps plein

Rentrée : début septembre

Lieu : ISAE, Campus SUPAERO

Langue : français mais certains cours sont dispensés en langue anglaise avec d'autres mastères de l'ISAE : les niveaux TOEFL 550 ou IBT 79 ou TOEIC 750 sont demandés comme pour les mastères en anglais.

Méthode pédagogique

Premier semestre : environ 500 heures d'enseignement dispensées de septembre à avril dans les locaux de l'ISAE par les professeurs permanents de l'ISAE et des experts du milieu professionnel, comprenant :

- cours magistraux, bureaux d'études, travaux pratiques et expérimentaux sur CAO, exercices corrigés sur la toile, travail en équipe, simulations sur MATLAB, OPNET, COSSAP, ...
- conférences, démonstrations en laboratoire, expérimentations sur liaisons et modems numériques à fibres optiques, récepteurs de navigation (GPS, ...),

→ projet de conception système, rédaction de rapports de synthèse.

Second semestre : réalisation d'une thèse professionnelle en entreprise, en laboratoire, en France ou à l'étranger d'une durée de quatre à six mois, validée par la soutenance.

Programme d'enseignement

Approche et conception système - 90 h

Optimisation combinatoire
Maîtrise des risques et sûreté de fonctionnement
Environnement spatial et effets
Systèmes spatiaux et conception des satellites
Aspects juridiques et économiques

Fondamentaux - 120 h

Information et codage
Traitement du signal
Télécommunications spatiales
Communications numériques (cours en anglais)
Liaisons radiofréquences
Fonctions microndes
Transmissions optiques

Systèmes électroniques et architectures numériques - 70 h

Architectures de traitement numérique
Intégration des systèmes électroniques
Spécification et conception de systèmes numériques
Récepteurs numériques de télécommunications (cours en anglais)
Récepteurs de navigation et hybridation (cours en anglais)

Réseaux de communications - 60 h

Introduction aux réseaux de communication par satellites
Outils de dimensionnement et de simulation des réseaux
Techniques avancées pour les réseaux de communication par satellites
Réseaux embarqués

Systèmes et applications spatiales - 70 h

Communications mobiles (cours en anglais)
Systèmes de communications spatiales
Systèmes de navigation et de localisation par satellite (cours en anglais)
Imagerie spatiale

Projet en équipe intégrée dont l'objectif est de mettre en pratique toutes les dimensions d'un projet : composante technique, gestion de projet et gestion d'équipe.



Perspectives professionnelles

Les diplômés accèdent à des postes d'ingénieurs développement et de conception-système dans l'industrie électronique et des télécommunications en France et à l'étranger, dans les centres de recherche et agences, ainsi qu'au sein de sociétés de service d'ingénierie.

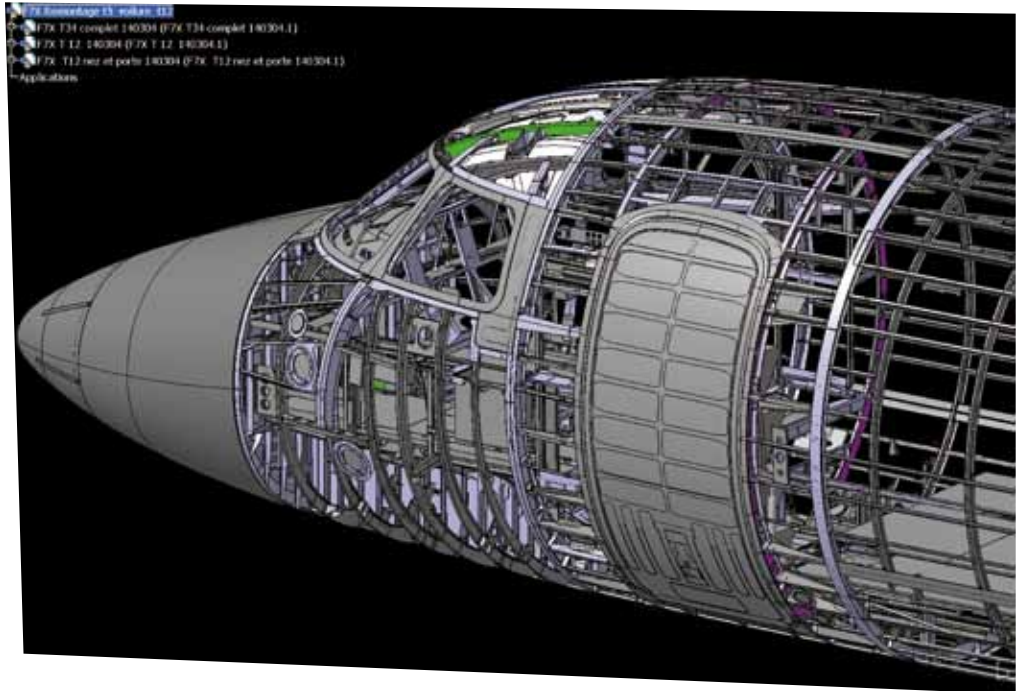
Les entreprises qui recrutent nos étudiants

EADS Astrium, Airbus, Altran Groupe, Transiciel, Astek, Sagem, Thales, Esa, CNES, Alcatel Space Industries, Armée de terre, France Telecom, CETE, Marine, ...

Specialized Masters
in engineering
in French

Structures aéronautiques et spatiales

Accrédité par la Conférence des Grandes Écoles



Objectifs

Dans un contexte compétitif international croissant où la recherche de matériaux nouveaux associée à l'optimisation des méthodes de calcul des structures sont des atouts majeurs de compétitivité des manufacturiers d'aéronefs ou des véhicules spatiaux, ce mastère offre, aux ingénieurs destinés aux métiers en conception, en recherche et développement, en certification, ou aux essais et qualification, une culture approfondie et multidisciplinaire en génie mécanique appliqué aux structures.

L'enseignement vise à développer une expertise au calcul numérique des structures les plus avancées, une connaissance des matériaux ainsi que sur leurs interactions fluides-structures.

La dynamique des structures souples, la modélisation et le contrôle des éléments structuraux complexes constituent le noyau central des enseignements de ce mastère.

Les objectifs du master sont de :

- former des spécialistes dans le domaine de la conception, fabrication et maintenance de structures légères,
- apprendre à maîtriser l'utilisation des matériaux spécifiques et l'environnement industriel de production d'aéronefs et de véhicules spatiaux.

Organisation de la formation

Chef de programme : Prof. Yves GOURINAT

Courriel : yves.gourinat@isae.fr

Durée : un an à temps plein

Rentrée : début septembre

Lieu : ISAE, Campus SUPAERO

Langue : français mais certains cours sont dispensés en langue anglaise avec d'autres mastères de l'ISAE : les niveaux TOEFL 550 ou IBT 79 ou TOEIC 750 sont demandés comme pour les mastères en anglais.

Méthode pédagogique

Premier semestre : environ 400 heures d'enseignement dispensées de septembre à avril dans les locaux de l'ISAE par les professeurs permanents de l'ISAE et des experts ou professionnels apportant les dernières connaissances de l'industrie dont : cours magistraux, bureaux d'études, travaux pratiques, simulations numériques, CAO, séances en laboratoire, visites industrielles.

Second semestre : réalisation d'une thèse professionnelle en entreprise, en laboratoire, en France ou à l'étranger d'une durée de quatre à six mois, validée par la soutenance.

Programme d'enseignement

Harmonisation et accès informatique - 31 h

Harmonisation Mécanique du vol, Harmonisation Structures, Harmonisation Structures – Coques, Harmonisation Aérodynamique, Harmonisation Matlab, Accès système informatique ISAE

Enseignements académiques - 378 h

Stratégie de développement des avion civils, Efforts aérodynamiques sur une structure, Charges Avion, Hélicoptères (cours en anglais), Commande active des

structures flexibles, Calcul de structures par éléments finis, Matériaux structuraux - matériaux composites, Structure des missiles et des lanceurs, Aéroélasticité, Caractérisation expérimentale des matériaux, Dynamique des structures avancées (Anglais), Conception assistée par ordinateur (CAO), Modélisation des structures composites, Capteurs, Structure des aéronefs, Architecture et structures des lanceurs

Projet en équipe Intégrée – 24 h

Intégrer toutes les dimensions d'un projet : composante technique, gestion de projet et gestion d'équipe

Perspectives professionnelles

Plus de cent ingénieurs ont été formés à cette spécialisation unique dans l'enseignement supérieur français.

Ils occupent aujourd'hui des fonctions d'ingénieurs-recherche ou d'ingénieurs de conception dans des entreprises internationales des secteurs aéronautique, spatial ou du génie mécanique.

Les entreprises qui recrutent nos étudiants

Airbus, EADS Groupe, Aéroconseil, Altran Groupe, Seditec, Snecma, Transiciel, Astek, Sagem, Thales, Esa, Thales Alenia Space, Renault, Clairis Technologies.

Témoignages

Interview Roberto G. Manjarrez Garduño, Mexico, Graduated in 2009

« I chose ISAE because I know that is one of the best aerospace engineering schools not only in France, in Europe and also around the world. In fact, I have spoken also with professors and engineers of other institutions and they agree that ISAE is the best higher institution of aeronautics studies in Europe for studies and research.

During the one-year study, I have learnt really a lot of things, not only academic, also about the life. The most important thing is to know that we are able to do a lot of things working more, to have more patience and confidence thanks to the strong support of ISAE's professors».

Interview Romain Lefèvre-Aunay - DSI RENAULT - CAE Project Manager, diplômé en 2007

« SUPAERO est une des écoles d'application de l'École Polytechnique, une référence en aéronautique et le spatial. « Qui peut le plus, peu le moins ». Les connaissances acquises peuvent se vendre dans toutes industries, y compris l'automobile, secteur dans lequel je travaille actuellement. J'ai apprécié le travail et réflexion en groupe ainsi que la disponibilité des professeurs envers les étudiants. Les échanges de réflexion avec les élèves de 3^e année de la formation ingénieur SUPAERO sont également très fructueux. Le mastère spécialisé dans une seconde école ingénieur suite à une formation initiale apporte les compétences permettant d'être opérationnel immédiatement. Ainsi, suite au mastère SAS, j'ai intégré Renault en tant que chef de projet d'un système d'information : Simulation Data Management».

Systèmes de propulsion aérospatiale

Accrédité par la Conférence des Grandes Écoles



Objectifs

Former des spécialistes moteurs - concepteurs et utilisateurs de turbomachines aéronautiques et terrestres, de moteurs d'engins spatiaux - ayant une solide formation en énergétique générale et sachant adopter une approche système complexe.

Acquérir des connaissances approfondies en aérothermique et technologie de tous les systèmes propulsifs (turboréacteurs, turbines à gaz, statoréacteurs, moteurs fusées, moteurs à combustion interne).

Organisation de la formation

Chef de programme : Prof. Jérémie GRESSIER

Courriel : jeremie.gressier@isae.fr

Durée : un an à temps plein

Rentrée : début septembre

Lieu : ISAE, Campus SUPAERO

Méthode pédagogique

Premier semestre : environ 400 heures d'enseignement dispensées de septembre à avril dans les locaux de l'ISAE par les professeurs permanents de l'ISAE et par des experts et professionnels apportant les dernières connaissances de l'industrie dont : cours magistraux, bureaux d'études, travaux pratiques, visites de sites industriels, travail en équipe.

Second semestre : réalisation d'une thèse professionnelle en entreprise, en laboratoire, en France ou à l'étranger d'une durée de quatre à six mois, validée par la soutenance.

Programme d'enseignement

Systèmes énergétiques - 125 h

Thermodynamique appliquée aux turbomachines, Essais globaux et partiels sur turbomachines et moteurs fusées, Intégration des systèmes de propulsion, Système moteur à piston, Energie et environnement, Energie nucléaire, piles à combustible, Mécatronique

Approfondissement «propulsion» - 255 h

Aérothermique, Écoulements diphasiques et combustion, Aéro-acoustique, Aérodynamique des turbomachines, Structures des machines en rotation, Matériaux moteur, Régulation des turbomachines, Propulsion chimique, CFD - Computational Fluid Dynamics, Projet long moteur, Conférences approfondissement

Projet en équipe intégrée - 23 h

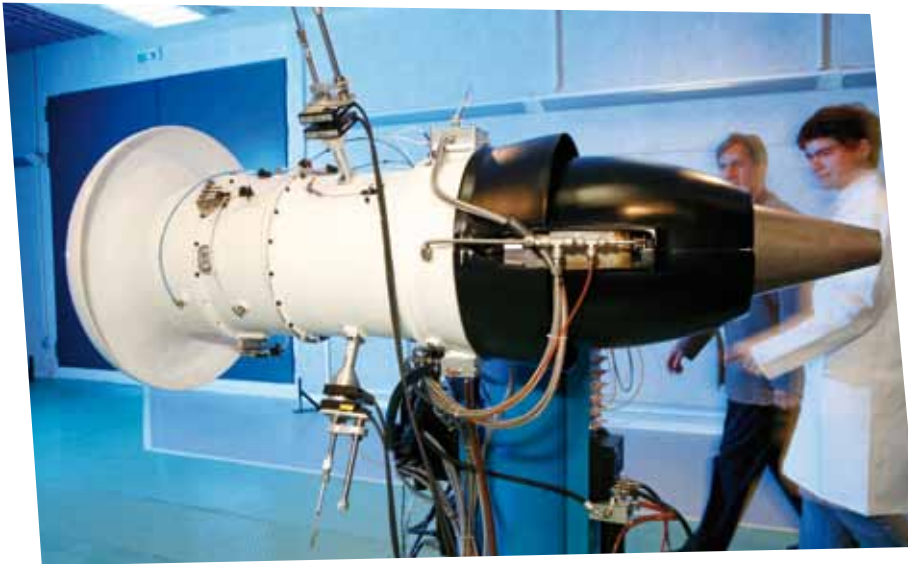
Intégrer toutes les dimensions d'un projet : composante technique, gestion de projet et gestion d'équipe

Perspectives professionnelles

La plupart des ingénieurs issus du mastère spécialisé occupent des postes de cadres supérieurs chez les motoristes ou avionneurs du secteur aéronautique et spatial, au sein de SSII ou encore dans le domaine de l'énergétique générale auprès d'entreprises publiques et privées.

Les entreprises qui recrutent nos étudiants

EADS Groupe, Aéroconseil, Altran Groupe, Seditec, Safran, Snecma, Transiciel, Astek, Sagem, Thales, Esa, Alcatel, DGA SPAe.



Management de grands projets (partenariat ISAE-HEC)

Accrédité par la Conférence des Grandes Écoles



Objectifs

La recherche de chefs de projet par les entreprises connaît un essor fulgurant depuis quelques années. Pour répondre à cette demande sur le marché de l'emploi, l'ISAE et le Groupe HEC ont associé leurs compétences complémentaires et reconnues internationalement pour former des chefs de projet. Le management de projet a pour principe de fédérer sur un objectif bien identifié, pour une durée déterminée et dans le respect de coût préétabli, une équipe d'experts et des ressources qui apportent leurs compétences spécifiques. Les managers de projets doivent posséder une bonne compréhension et une

maîtrise de disciplines très variées comme les techniques et technologies mises en œuvre, le marketing, la finance, les achats, la stratégie d'entreprise, le management de l'innovation, les ressources humaines, le team building mais aussi la qualité, les techniques de planification, la gestion des risques, les choix d'investissement, ...

L'ISAE et HEC mobilisent leurs experts pour offrir cette formation de haut niveau académique et opérationnelle à des étudiants d'origines diverses et complémentaires, avec une forte orientation internationale.

Les objectifs du mastère MGP sont :

- ➔ acquérir une spécialisation de haut niveau, académique et opérationnelle portant à la fois sur l'ingénierie et le management du projet,
- ➔ maîtriser les fondements, méthodes et pratiques de management de projets dans un environnement international,
- ➔ faciliter l'insertion professionnelle par des rencontres avec les entreprises françaises et étrangères et au travers de la mission menée en temps partiel pendant la scolarité et le stage de fin d'études.

Organisation de la formation

Chefs de programme

➔ Prof. Philippe GIRARD

Courriel : philippe.girard@isae.fr

➔ Prof. Sihen JOUINI

Courriel : jouini@hec.fr

Durée : une année à temps plein

Rentrée : septembre

Lieu : ISAE, Campus de Rangueil et HEC Toulouse

Langue : français mais certains cours sont dispensés en langue anglaise ; une bonne maîtrise de l'anglais est donc demandée.

Méthode pédagogique

Les fondamentaux de la gestion de projets et économie : huit mois d'enseignement intensif d'environ 600 heures de travail effectuées en salle de classe, répartis de septembre à décembre sur le site SUPAERO à Toulouse et de janvier à avril à HEC en région parisienne.

Cours magistraux

- travaux dirigés,
- études de cas individuelles et en groupe,
- débats, conférences et séminaires,
- études de cas informatisées sur tableurs,
- visites de sites industriels ou de projets en cours de réalisation,
- mission et mise en application pratique en milieu professionnel,
- projet de cinq mois, réalisé partiellement en entreprise sous forme de missions,
- stage en entreprise d'une durée de quatre mois, validé par la soutenance d'une thèse professionnelle.

Programme d'enseignement

Le programme est constitué de douze modules, certains pouvant être dispensés en anglais.

Trois axes verticaux

Le projet

Structure projet – Connaître les bases du management de projet et les outils de simulation (conduite de projet, analyse des risques, planification, ...) – Coûts et financement – Évaluation et techniques de chiffrage, ingénierie financière internationale, marketing et action commerciale, ... – Team building – Techniques de constitution et de motivation des équipes de projet.

L'entreprise

Environnement projet – Comprendre les fondamentaux du monde de l'entreprise et la manière dont l'entreprise intègre le projet (gestion de production, management de la qualité, ...) – Comptabilité et gestion – Analyse comptable et financière, comptabilité analytique budgétaire – Ressources humaines – Réglementation du travail, sous-traitance, expatriation, techniques de négociation, de motivation et d'argumentation.

L'international

Droit des affaires – Comprendre et maîtriser la spécificité des projets de dimension internationale – Économie mondiale –

Connaître les financements et les possibilités de couverture des risques des investissements à l'étranger – Management interculturel – Prendre en compte la dimension interculturelle dans le monde des affaires.

Trois axes horizontaux

Structurer et définir

Les grands principes de la décomposition d'un projet en tâches élémentaires : organigramme technique, WBS, phasage, outils de planification, ... – Élaboration d'un cahier des charges, d'une spécification technique, ...

Chiffrer et financer

Estimation des coûts, simulation de rentabilité et financements possibles de projets.

Manager et négocier

Recrutement et délégation, motivation d'une équipe et outil de communication.

Frais de scolarité 2010-2011

Voir tarif indiqué sur le site www.isae.fr

Perspectives professionnelles

Le MS Management de grands projets ouvre des carrières passionnantes vers des métiers porteurs de perspectives d'avenir prometteuses :

- chef de projets,
- ingénieur d'affaires /commercial,
- consultant,
- responsable logistique / production / exploitation,
- ingénieurs d'études,
- acheteurs.

Les entreprises qui recrutent nos étudiants

Advancy, Air France, Amgen (USA), BearingPoint, Bombardier Transport, Bouygues Bâtiment, Chryso, Cofathec Projis, Costamagna Distribution, CVA (Maroc), Deltaplus (Chine), EADS Astrium Services, Ernst & Young, Ge Energy Products Europe, General Electric - Energy division, GreenAffair, Laboratoires Génévrier, Laboratoires Servier, Le Club des Créateurs de Beauté, L'Oreal, Masaï, MI-GSO, Natixis, Procter & Gamble, PSA Peugeot Citroen, PSA Peugeot Citroen (Buenos Aires), Renault, S2E Consulting, Saacke, Seditec, SEDITEC - Groupe Aeroconseil, SNECMA - Groupe Safran, Société Générale, AXA, ...

Ingénierie et modèles de la finance avec ESC Toulouse et INSA Toulouse

Accrédité par la Conférence des Grandes Écoles



Objectifs

Le programme du mastère IMF est le fruit d'un partenariat unique entre deux écoles d'ingénieurs et une école de commerce dont la Finance est un des points d'excellence avec un laboratoire de recherche de réputation internationale sur le domaine. En réponse à une forte demande des établissements financiers pour ce type de qualification, ce mastère centré sur les mathématiques financières et la finance quantitative a pour objectifs de :

- ➔ former des spécialistes de la Finance en donnant un poids très significatif aux composantes suivantes : mathématiques de la finance, économétrie et informatique,
- ➔ acquérir une aptitude à la modélisation et la formalisation appuyée sur une véritable compréhension des enjeux et des mécanismes financiers,
- ➔ maîtriser les mathématiques de la Finance, l'économétrie et l'informatique, notamment à travers le développement de projets et l'élaboration de modèles de décision, d'analyse et d'évaluation.

Organisation de la formation

Chefs de programme

➔ Prof. Laurent GERMAIN

Courriel : laurent.germain@isae.fr

➔ Prof. Jean-Claude GABILLON

Courriel : Jc.gabillon@esc-toulouse.fr

➔ Prof. Benoît TRUONG-VAN

Courriel : benoit.Truong-Van@gmm.insa-tlse.fr

Durée : une année à temps plein

Rentrée : début octobre

Lieu : ISAE, Campus de Rangueil et ESC Toulouse

Langue : français mais certains cours sont dispensés en langue anglaise ; une bonne maîtrise de l'anglais est donc demandée.



Méthode pédagogique

Premier semestre : environ 450 heures d'enseignement pédagogique répartis durant huit mois sur les sites de l'ISAE et de l'École Supérieure de Commerce de Toulouse.

Les enseignements comprennent :

- cours magistraux,
- enseignements dirigés,
- études de cas individuelles et en groupe,
- débats, conférences et séminaires,
- travail sur tableurs,
- analyses d'articles,
- simulation sur ordinateur,
- bureaux d'études sur machines,
- étude de dossier d'application financière,
- présentation d'articles par des étudiants.

Second semestre : réalisation d'une thèse professionnelle en entreprise, en France ou à l'étranger d'une durée de quatre à six mois, et validée par la soutenance.

Programme d'enseignement

Le programme est constitué de vingt-quatre modules spécialisés :

- Finance d'entreprise
- Analyse et prévision financière
- Macro-économie financière
- Finance empirique
- Évaluation des entreprises
- Fusions et acquisitions
- Techniques financières internationales
- Gestion de portefeuilles
- Gestion des risques bancaires
- Taux et produits dérivés de taux
- Risque de crédit et produits dérivés de crédit
- Introduction aux processus stochastiques en temps continu
- Méthode informatique

- Calcul stochastique pour la finance
- Évaluation et couverture des produits dérivés
- Résolution numérique des EDP pour la finance
- Économétrie des séries temporelles et modèles ARCH en finance
- Statistique des processus en finance
- Méthodes neuronales et applications financières
- Microstructure et organisation des marchés
- Gestion des risques de l'entreprise
- Finance de l'entreprise approfondie
- Risques financiers
- Gestion des risques bancaires

Perspectives professionnelles

Le mastère "ingénierie et modèles de la finance" vise les emplois offerts par les établissements financiers qui exigent une double compétence : une aptitude à la modélisation et à la formalisation ainsi qu'une bonne compréhension des mécanismes financiers essentiels.

Témoignage

Trois questions à Hervé Boco, Département Risk Management chez AXA - promotion 2004

Professeur Hervé, quel est à votre avis le point fort du mastère ?

«La principale qualité du mastère ingénierie et modèles de la finance est l'alliance entre mathématiques financières, revue exhaustive des différents produits financiers et expertise de l'entreprise d'un point de vue comptable et investissement. La polyvalence, avec notamment la gestion des risques, permet d'aborder tous les métiers de la finance et de l'assurance».

Cette formation vous a-t-elle permis de vous insérer facilement dans la vie active ?

«La société qui m'a recruté s'est montrée très intéressée par les propositions novatrices que je pouvais apporter dans la gestion des risques techniques (évaluation mathématique du montant plausible des sinistres) et dans la gestion des process (amélioration du traitement des tâches)».

Si vous deviez recommander cette formation à un ami, que lui diriez-vous ?

«Qu'elle ouvre à une grande panoplie de métiers possibles tels que recherche financière, audit, trading, gestion de projet, etc. et qu'elle présente l'avantage auprès des entreprises d'associer le nom de trois écoles prestigieuses».

Specialized Masters
in management
in French

Master of Science in Aerospace Mechanics and Avionics

National Master Degree Accredited by the Ministry of Higher Education



Aims

The Master of Science in aerospace mechanics and avionics is a two-year course of study that allows students to develop a high level of competence in engineering

science, current technology, and engineering design related to aeronautics and space. It aims at preparing students for careers in the aerospace industry in Europe and worldwide. The program consists of a total of 4 semesters of 30 ECTS each, ie 120 ECTS credits for the whole program. The MSc AMA starts with a first semester emphasizing aerospace mechanics or control and avionics to prepare students to the majors to be selected for semester two and three: «aerodynamics & fluid mechanics», «structures & aeronautical engineering» or «command & control». Students have strong opportunities to develop practical skills through research projects in ISAE's laboratories and professional thesis during internships in aerospace industry.

Organization

Head of common program and global teaching coordination

→ Didier DELORME

E-mail: didier.delorme@isae.fr

Head of program major aerodynamics

→ Prof. Laurent JOLY

E-mail: laurent.joly@isae.fr

Head of program major Aircraft control

→ Prof. Yves BRIERE

E-mail: yves.briere@isae.fr

Head of program major Aeronautical structures

→ Prof. Jacques HUET

E-mail: jacques.huet@isae.fr

Head of program major Aeronautical engineering

→ Prof. Alain LACOMBE

E-mail: alain.lacombe@isae.fr

Head of program major Helicopter engineering

→ Prof. Frédéric LACHAUD

E-mail: frederic.lachaud@isae.fr

Duration of studies: Two year full time

Beginning of classes: September

Location: ISAE, Campus SUPAERO and campus ENSICA for some courses

Teaching language: English, except major «Advanced Fluid Engineering» during semester 3 taught in French, students selecting these courses must be proficient in French.

Pedagogical approach

The ISAE Master's programs are designed with a combination of lectures, personal project and assignments and thesis projects to be performed in industrial environment or in ISAE's laboratories. They are taught in English.

Compliant with European higher education system, the MSc AMA is a two-year program with a total of 120 ECTS credits.

The MSc AMA program includes three-semester academic session, in ISAE's premises, provided by permanent professors and experts from aerospace industry bringing current knowledge and experience, including: lectures, tutorials, case study, personal project in laboratory and industrial visits.

The last semester consists in performing professional thesis in a firm or a laboratory in the aerospace sector. After the project, students having obtained 120 credits under examination will be awarded the Master of Science in Aerospace Mechanics and Avionics from ISAE.

Syllabus

Semester 1

Common part - 105 h

Mathematics: Foreign languages - structures standardisation - Matlab standardisation

Aerospace and mechanical engineering - 233 h

Aircraft structures - Aerodynamics 1- Propulsion - Control & avionics - Computer Aid Design - Vibrations & modal analysis - Flight dynamics - Applied Aerodynamics - Modelling of Aerostructures (MEF)

HUAN Qianjiao, China, MSc AMA Graduated in 2010

After I got my bachelor degree at BUAA (Beijing University of Aeronautics and Aerospace), I heard that there is an opportunity of the AIRBUS scholarship program to study the Master of Science in Aerospace Mechanics and Avionics at ISAE. As ISAE is the best European school for aeronautics, I'm very grateful for AIRBUS and ISAE gave me this opportunity to make my dream come true.

During the two years at ISAE, we had classes not only in technologies but also in lots of other domains, such as management, language and culture. More than half of the classes are given by professors who are come from the industrial companies, AIRBUS, CNES, ONERA, EUROCOPTER, etc. We learnt the knowledge by a more professional way with helps a lot in our future career. The internship which took place at the last semester gives us a great opportunity to link what we have learnt at school to what we are going to do as a job in the future. For me, I have performed a six months internship at AIRBUS France which is a precious chance to me and leads me to my future career. After this internship, I was recruited by SOGETI High Tech which is a subcontractor of AIRBUS and I'm working now on some projects of structure calculation on the AIRBUS family aircrafts.

More over, this two years mater is an international program with students coming from all over the word. Here, we got the chance to know the different cultures and ways of thinking in different countries and we made great friendship which we will never forget».

Semester 2: 30 credits

Common part (320 h)

Foreign languages - European cultures and Research Project in ISAE's laboratories (250 h)

Students have to select one major among:

Major 1: Design - aerodynamics & aerothermics - 120 h

Softwares for computational fluid dynamics – Acoustics – Flight characteristics – Experimental approach in fluid mechanics

Major 2: Aircraft control - 119 h

Control implementation – Flight characteristics- Aircraft control - guidance – Navigation

Major 3: Aeronautical structures -120 h

Materials for airframes – Calculating structures - Dimensioning structures – Design project

Semester 3: 30 credits

Common part - 150 h

Foreign languages – Research Project in ISAE's laboratories (100 h)

Students have to select one major among:

Major 1: Advanced Fluid Engineering - 197 h

Turbomachinery – Aeroelasticity – Turbomachinery 1: Advanced

aerodynamics of turbomachines – Turbulence Aeroacoustics – Numerical fluid mechanics – Turbomachinery 2: The turbomachine system

Major 2: Flight control - Guidance - 179 h

Multivariables systems – Optimal control – Estimation - Kalman filter – Control of flexible structures – Robust control - Space applications – Aircraft identification

Major 3: Aeronautical structures - 223 h

Aircraft techniques – Helicopters – Flight dynamics - Propulsion – Quality – Dynamics of aeronautical and space structures – Advanced structural dynamics - Mechanics of laminated structures – Production and maintenance of aircraft

Major 4: Aeronautical engineering - 233 h

Aircraft techniques - Helicopters - Flight dynamics - Propulsion - Advanced structural dynamics Aeronautical engineering environnement - Mastery of aeronautical products - Aerodynamics - Materials for aerospace structures - Composites

Major 5: Helicopter engineering - 261 h

Helicopter propulsion and motorization – Helicopter avionics – Arming - mission – Helicopter flights test- Certification – Helicopter maintenance – Aerodynamics - Flight qualities - Performances – Helicopter dynamics - Helicopter construction materials & techniques – Systems - Prototypes - tests- production quality assurance

Semester 4

Students conduct a thesis in aeronautical industry or organisation, in France or abroad and supervised by a tutor from the host organisation and from ISAE. The Master thesis is concluded by the preparation of a report and an oral dissertation in front of jury.

Career opportunities

Toulouse is at the hub of the European aerospace industry, and accommodates leading European engineering and postgraduate institutions.

The majority of graduates find positions in the aerospace industry (aircraft, engine and equipment manufacturers), and government agencies.

They have senior positions in industry as researchers, experts, and heads of projects or managers.

Companies recruiting our students

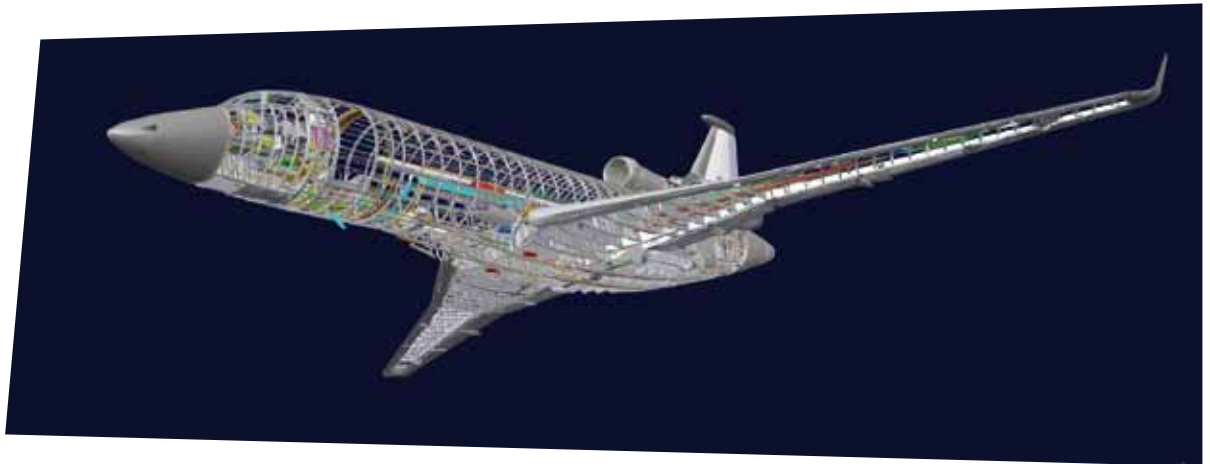
AIRBUS, EADS, ALENIA, EMBRAER, CNES, MECACHROME Canada, MTU, ...

Industrial Partnerships

Airbus, wanting to motivate engineering Chinese students in the international orientation of their studies, awards international scholarships to a limited number of students applying to MSc AMA. Awarded students by Airbus take on a commitment to follow the study program Aeronautical structures specialisation.

Master of Science in Aeronautical and Space Systems

National Master Degree Accredited by the Ministry of Higher Education



Aims

To support its steadily growing and to maintain business competitiveness, the global aerospace industry needs high qualified engineers or researchers to innovate to new technologies taking into account environmental constraints more and more demanding. Design complex aerospace systems involve multinational geographically disseminated teams of project managers or various experts working in collaborative environment through integrated development platform tools. The Master Aeronautical and Space Systems (AESS) is an evolution of the former MSc Aeronautical Engineering and Space Technology and is intended to educate graduate students in subjects relevant to these demanding challenges and needs of the industry. The MSc ASSE is designed to be multidisciplinary preparing future engineers to easily and efficiently work on aeronautical systems, space systems and their applications or embedded systems, with emphasis on the complete life cycle of the system. With a large spectrum of knowledge the MSc AESS allows students

to tackle various aspects from design to operations of systems either in a research organism or in an aerospace company in a multinational environment. The MSc AESS consists of a total of 4 semesters of 30 ECTS each, ie 120 ECTS credits for the whole program. The MSc AESS starts with a first semester emphasizing aerospace engineering fundamentals, and then continues toward two main majors during semester two: «Electronics and computer sciences», «Aircraft control - Guidance». During semester three students emphasize on one major in depth among four: major Aircraft systems, major Embedded Systems, major GNSS, major space systems.

Students have strong opportunities to develop practical skills through personal research projects in ISAE's laboratories and professional thesis during internships in aerospace industry.

Organization

Head of program major Aircraft Systems

✈ Prof. Valérie BUDINGER

E-mail: valerie.budinger@isae.fr

Head of program major Embedded Systems

→ Prof. Janette CARDOSO

E-mail: janette.cardoso@isae.fr

Head of Program major Space Systems

→ Prof. Bénédicte ESCUDIER

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Head of program major Global Navigation Satellite Systems

→ Prof. Michel BOUSQUET

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Duration of studies: Two-year full time

Beginning of classes: September

Location: ISAE, Campus SUPAERO

Teaching language: English

Pedagogical approach

ISAE Master's programs are designed with a combination of lectures, personal project and assignments and thesis projects to be performed in industrial environment or in ISAE's laboratories. They are taught in English. Interweaving the teaching of both Masters, they offer several options enabling graduates to envisage their professional career with confidence in accordance with their wishes and interests.

Syllabus

Semester 1: 30 credits (in English)

Common part - 113 h

Mathematics - Foreign languages - Matlab standardisation - MATLAB complements - Programming - Mechanics

Aerospace engineering (210 h)

Sensors and measuring systems - Aircraft and airframe architecture - Flight Dynamics - Automatic control - Design and validation of DES - Signal processing and DSP - Introduction to mathematical logic - Architecture and design of integrated electronics function - Launcher and space vehicles - Aeronautical Thermopropulsion - Engines-Propulsion - Data transmission - Avionics systems

Semester 2: 30 credits

Common part - 320 h

Foreign languages - European cultures and Research Project in ISAE's laboratories (250 h)

Students have to select one major among:

Major 1: Electronics and computer sciences - 120 h

Modelling and simulation - Antenna and radars - Hardware and software co-design - Distributed and parallel computing - Network architecture and programming

Major 2: Aircraft control - Guidance- 119 h

Control implementation – Flight characteristics- Aircraft control - guidance – Navigation

Semester 3: 30 credits

Common part (150 h)

Foreign languages – Research Project in ISAE's laboratories (100h)

Students have to select one major among:

Major 1: Aircraft Systems - 238 h

Computer Safety - Hybrid Systems - System Engineering- System Dependability- Optimization

Converters- Hydraulic, Electromechanical and EHA actuators- Actuators control- Electromagnetic compatibility

- Airframe-linked systems - Avionics systems- Safety analysis- Avionics and systems trouble shooting maintenance

Major 2: Space Systems - 246 h

Advanced control and applications - Satellites guidance and control - Launchers guidance and control - Space environment and effects - Mission analysis and orbital mechanics - Space communications systems - Space project and systems - Satellite electrical systems - Satellite engineering and design - Satellite thermal control systems - On board systems and data handling - Space projects economy - Space projects legal aspects

Major 3: Embedded Systems - 230 h

Real time language - Architecture description language - Real time operational systems - Real time control of a space system - Certification - Computer Safety - Hybrid Systems - System Engineering - System Dependability - Optimization - Electromagnetic compatibility - Estimation and Kalman filter - Energetic constraints - Avionics and data buses

Major 4: Global Navigation Satellite Systems (GNSS) - 316 h

Digital communications - Spread spectrum techniques - Orbits and satellites platforms - Radiofrequency links and propagation - Computer Safety - Hybrid Systems - System Engineering - System Dependability - Optimization - Estimation



and Kalman filter - Positioning determination and reference systems - Navigation and localization systems by satellite - Communication and navigation satellite payload - GNSS systems

Application of GNSS - Navigation digital receivers - GNSS receivers - Legal and economic aspects

Common part: Seminars and conferences

Seminar «Vehicle design: system aspects of atmosphere re-entry»

«Electrical propulsion» conference

«Space mechanisms» conference

«History of Space Exploration» conference

Semester 4

Students conduct a thesis in aeronautical industry or organisation, in France or abroad and supervised by a tutor from the host organisation and from ISAE. The Master thesis is concluded by the preparation of a report and an oral dissertation in front of jury.

Career opportunities

Toulouse is at the hub of the European aerospace industry, and accommodates leading European engineering and postgraduate institutions.

The majority of graduates find positions in the major aerospace industry or consulting companies (aircraft, spacecraft, engine, launcher, and engine), equipment manufacturers and government agencies.

They have senior positions in industry as researchers, experts, and heads of projects or managers.

Companies recruiting our students

AIRBUS, EADS, ASTRIUM, EUROCOPTER, ALENIA, EMBRAER, CNES, MECACHROME Canada, MTU, SAFRAN, ROLLS ROYCE, THALES ALENIA SPACE, ESA, INDRA, ALTRAN...

Witnesses Masters of Science MSc AESS and MSc AMA

Vladimir COCA, Spain, Master AEST- Aero, and EuMAS recipient, working at INDRA

Why did you choose ISAE for your master?

«After some years working in industry, I decided I needed a reorientation of my professional career. I was convinced I needed international experience to evolve and improve at my job, and I wanted to do it in the aeronautical sector, so I began searching for a Master. I tried to make a list with the best Aeronautics European schools, and so ISAE was my first option, but had the language issue. I was kindly surprised when I read about the opportunity to pursue my course in English while learning French and so I didn't need to think anymore, I applied instantly. I came from another area of study, but as I had already begun Aeronautical Courses, I decided to apply for the MSc in Aeronautical and Space Engineering».

What has the course brought you, what have you gained through (doing) the masters' course?

«I insist on the International aspect of the Master. I improved my English, and learned French. The school is also very well-known worldwide and the course contents are amazing for those having a passion to Aerospace. I learned Aeronautics while working in a multinational team with stunning projects. The internship gave me the opportunity to make one of my dreams come true by working some months in one of the best aeronautics industries worldwide while discovering the amazing city of Toulouse».

Has this master helped you in your current or past job?

«Not in the past, which I quit before joining Master's, but It helped indeed in my current job. International experience was the key asset to get my job because company works in projects worldwide, and School is also one of the best considered institutions to study Aeronautics. Now I work in one of the most important European Projects for the next decade, and I think the Master gave me the chance to advance some steps further than before taking it».

What's your professional situation today?

«I'm currently Consultant in a leading European company working in International ATM, Airlines and Airport projects, while doing it at my home city, which is not easy due to a lack of companies working in Aeronautics, and ISAE Master's Programme helped indeed to achieve my objective».

Moulya KUMAR, India, MSc AMA 2009, selected for EADS PROGRESS program

Why did you choose ISAE for your master?

«I have been interested in the fields of Aerospace and Aeronautics since an early age. Since ISAE is one of the acclaimed institutions in the Aerospace domain, known for imparting quality education and providing effective learning opportunities to its students, I was enthusiastic to be a part of this school. Also, since Toulouse is the hub of Aeronautical activities in Europe, I felt that graduate study in ISAE will be the most logical extension of my academic pursuits and a major step towards achieving my objectives».

What advice would you give to someone considering the MSc AMA in order to succeed in their studies?

«I feel that the effective way of learning is through practical experiences and exposure to industrial world. Hence, my main advice to the students of ISAE who are pursuing the Masters degree course, is to utilize the fact that there are several Aeronautical industries in and around Toulouse which gives them the opportunity to broaden their classroom knowledge and learn professional etiquettes. The students must grab every opportunity that ISAE provides for this and also make their own path to gain insight to cutting-edge technology. Build a vision and work towards reaching it!».

What has the MSc AMA brought you, what have you gained through the masters' course?

«I got exposed to the current trends in the Aeronautical society and the numerous opportunities available for young engineers such as myself to build up my professional path. Also it gave me an excellent opportunity to interact with people of different cultures both at my school as well as in the day-to-day activities. I found this experience very rewarding as it helped me grow as an individual with a better perspective towards life».

Has the MSc AMA helped you in your current or past job?

«Working in an industrial atmosphere is completely different from a classroom study, both professionally and personally. Especially, when you are exposed to an international working culture, you have to learn to understand other's orientation and work for the group objectives. The 5 month internship which I undertook in France helped me develop these abilities which are very essential to one's own development and necessary to start my professional career».

What's your professional situation today?

«I have been selected to work for EADS Group through 'PROfessional and GRaduate Entry Support Scheme (PROGRESS)', a program in the EADS».

Common ISAE's admission procedures

Postgraduate Specialized Masters in engineering

SM AMS - SM EMS - SM ERSOS - SM HE - SM SCS - SM SEN - SM TAS Aero* - SM TAS Astro - MS EAS - MS SAS - MS SPA: Tuition fees : 12500 €

*TAS Aero-FTE: 18000 €

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

*TAS Aero-FTE: 12000 €

SM ASAA - Tuition fees: 12000 €

French and European Students: 6000 € (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

Masters of Science

Tuition fees 2010-2012: 14000 € for the two-year master program

European students: 8000€ (students graduated in the year of enrolment or the year before, and with no professional experience).

Academic requirements

Applicants must have a bachelor's degree or equivalent degree, in the following areas:

MSc AMA: bachelor in aerospace or mechatronics or mechanical engineering

MSc AESS: Bachelor in aerospace or mechatronics or physics or electrical, or telecommunications engineering

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

Application fees: 65 € (non-refundable)

Other admission procedures

MS IEVex

Selection and admission by the French Ministry of Defence, contact us for more detailed information.

MS IMF

Selection and admission organized by ESC Toulouse: www.esc-toulouse.com
Contact us for more detailed information.

MS MGP

Selection and admission organized by HEC:
www.hec.edu/Specialized-Masters
Contact us for more detailed information.

Language requirements for Masters in English

Language qualification requested:

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

Your contacts at ISAE

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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

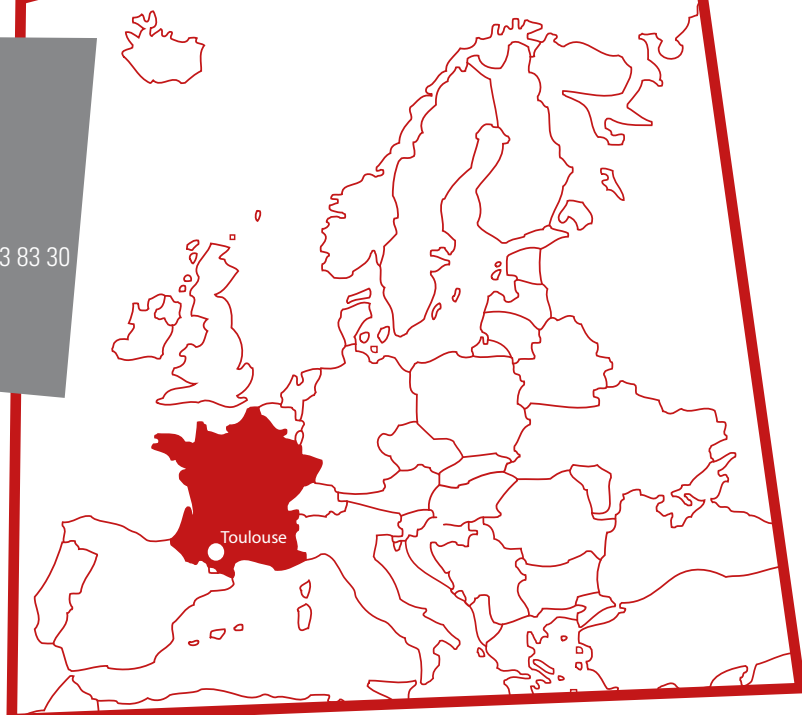
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Université
de Toulouse



ISAE

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