

Master of Science in Aeronautical Mechanics and Energetics (AME)

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Aims

The Master of Science in Aeronautical Mechanics and Energetics offers a common-core syllabus with elective majors:

- Energetics and Propulsion
- High temperature materials

After completing the first year, students have basic knowledge on propulsion systems and materials and structures from aeronautical and space engineering.

At the end of the first year, students choose a major with a strong specialization either in energetics or materials for turbine engines.

At the end of the two years, students have thorough knowledge in the major they have chosen on theoretical, numerical and experimental aspects, getting the latest advances on these research areas.

Individual research projects and internships (particularly the thesis) allow students to put skills into practice and get ready for labour market.



www.isae-ensma.fr

Organization & Contacts

Duration of studies: Two-year full time

Beginning of classes: September

Location: ISAE-ENSMA

Address: 1 avenue Clément Ader - Téléport 2 - BP 40109 - 86961 Futuroscope Chasseneuil Cedex

Tel: +33 5 49 49 80 16

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Teaching language:
English

Course Director: Prof. Julien Sotton - julien.sotton@isae-ensma.fr

Head of External Relations Office: Mrs. Aurélie Cotillon - international@ensma.fr

Two-year program organization

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	August	Sept.
Year 1	Semester 1 Common part					Semester 2 Common part, Major and Research project							
Year 2	Semester 3 Major and Research project					Semester 4 Master thesis					Master thesis defense		

Pedagogical approach



Fan of the concrete wind tunnel

The two-year program is entirely taught in English, with a total of 120 ECTS credits, 30 ECTS credits for each semester. After a common-core syllabus, students choose among 2 majors: propulsion or high temperature materials. The final semester is dedicated to the master thesis. Students have to carry out a 5-month internship in a company or a laboratory, in France or abroad.

The training program is composed by lectures, conferences, class works, laboratory sessions and projects. It also offers learning French for non French-speaking students and French and European culture courses. These teachings are included for the diploma delivery.

Syllabus

Semester 1: 30 credits

Common-core syllabus - 250 h

Foreign languages, French and European culture, Conferences, Reactive mixture thermochemistry, Propulsion 1, Embedded systems, Introduction to heat transfer, Structural mechanics, Numerical methods, Flight mechanics

Semester 2: 30 credits

Common-core syllabus - 330 h

Foreign languages, French and European culture, Research project

Major 1: Aerodynamics-Propulsion - 125 h

Fluid mechanics, Gas dynamics, Propulsion 2, Metrology

Major 2: Structures-Materials - 125 h

Vibrations-Finite element method, Project in structures, Materials science, Helicopters

Semester 3: 30 credits

Common-core syllabus - 160 h

Foreign languages, Research project

Major 1: Energetics and Propulsion (EPROP) - 250 h

Turbulence, Combustion, Atomisation and injection, Two-phase flows combustion, Turbulent combustion, Turbomachinery, Rocket propulsion, Radiation in semi-transparent environment, Turbulent heat exchange, New combustion mode for propulsion, Numerical combustion for engines

Major 2: High Temperature Materials (HTM) - 250 h

Finite element modelling, Plasticity-viscoplasticity, Materials mechanical properties, Fracture mechanics, Fatigue, Atomic diffusion and applications, High temperature alloys, Thermal barrier coatings for gas turbine engine, Materials processing, Engineering failure analysis, Corrosion of engineering materials, Creep

Semester 4 : 30 credits

Master thesis - 5 months

Master thesis

Students conduct a thesis in a company or a laboratory from aeronautical area, in France or abroad. The project is supervised by a tutor from the host organisation and from ISAE-ENSMA. The Master thesis is concluded by the preparation of a report and a public defense.



Vulcain 2 - Snecma Groupe Safran

Career opportunities

With the AME Master of Science, the young graduates will join R&D and R&T departments from the leading transportation and energy industries (mainly aeronautical engineering).

The aeronautical area is strongly expanding and new markets are emerging, mainly in Asia.

One of the issues of transportation area is the design of cleaner and less expensive systems. It is possible thanks to an optimization process of propulsion systems and structures, but also thanks to important advances in technology. Using new combustion methods and new materials - lighter and higher temperature resistant - as well as the optimization, the design of systems have to come up to these issues.

The students will be able to work either in international companies or in a research laboratory to carry on with a PhD program.



GE90 Engine - Snecma Groupe Safran



Ariane 5 Rocket - ESA/CNES/Arianespace/ CEF



Falcon X7 and A380 - Dassault Aviation

Admission procedures

Admission requirements

Applicants must have a bachelor's degree or equivalent degree in aerospace or mechatronics or mechanical engineering.

Tuition fees 2015-2017

- 14 000 euros for the two-year master program for international students (tuition waivers awarded within exchange programs)
- 8 000 euros for the two-year master program for European students (students graduated in the year of enrolment or the year before, and with no professional experience)

Selection and admission are made by an admission committee

Possible interviews can be organized if necessary

Deadlines for application

Several admission committees scheduled from January to July 2015

Language qualification requested

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

Application to Master AME at:

[http://www.ensma.fr/en/
admission/other-degrees/](http://www.ensma.fr/en/admission/other-degrees/)

ISAE-ENSMA in few words

Founded in Poitiers in 1948, ISAE-ENSMA has been located since 1993 next to the site of Futuroscope, one of the famous European Theme Parks. In sixty years, our school has acquired a reputation for excellence by training more than 5000 high level engineers, supported by a world famous research program developed through multiple partnerships with large companies, which, in addition, hire many of our graduate students. The academic training given at ISAE-ENSMA enables the young graduate engineers to choose jobs in engineering design departments, research and development mainly in the aeronautical and space industries, and more generally in the ground transportation, mechanics and energy industries.

Teaching departments

Fluid mechanics and Aerodynamics
Energetics and Heat transfer
Materials and Structures

Computer science and Automatics
Engineering of industrial systems
Management and liberal studies

Research

- The P' Institute (UPR 3346)

P' is composed of six laboratories in combustion and detonation, aerodynamics, heat transfer, mechanics and physics of materials and mechanical engineering.

A technological platform called the CEAT (research center in aerodynamics and heat transfer), from the University of Poitiers and ENSMA, gathers heavy research facilities as well as the facilities for the supersonic teaching of the school.

www.pprime.fr

- Laboratory of Computer Science and Automatic Control for Systems

The laboratory is structured around four axes (or teams):

Theme 1: Data and model engineering,

Theme 3: Modelling, identification and diagnosis of systems

Theme 2: Real-time embedded systems modeling

Theme 4: Systems analysis and control

ISAE

The "Institut Supérieur de l'Aéronautique et de l'Espace" was created in 2007 from the merger of the two prestigious French postgraduate schools of engineering, SUPAERO and ENSICA. Today, ISAE is a world-class higher institute of 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.

ISAE Group

The ISAE Group gathers French engineering schools under the ISAE brand (Institut Supérieur de l'Aéronautique et de l'Espace) and thus contributes to the valorization of the engineering training in the aeronautical and space fields.

The ISAE Group will enable to strengthen the schools' attraction towards the students, to optimize the adequacy between the training and the employers' need, and to develop research of excellence and international opening.

The schools, from the ISAE Group, deliver high-level engineering trainings (ISAE-ENSMA, SUPAERO, and ENSICA), masters, specialized masters, and PhD programs.

International networks

The PEGASUS network is the brainchild of ISAE-ENSMA, ISAE and ENAC. It aims to promote aerospace studies in Europe and delivers a « Pegasus Award and Certificate » to our students speaking two languages and who's spent at least 5 months abroad.

The Sino-European Institute of Aviation Engineering (SIAE) is a Sino-foreign cooperative education organization co-founded by the Civil Aviation University of China (CAUC) in Tianjin and the higher French aeronautical schools ENAC, ISAE-ENSMA and ISAE. The aim of the Institute is the training of talented engineers and managers for the Civil Aviation in China.

The PFIEV (Programme de Formation d'Ingénieurs d'Excellence au Vietnam), which ISAE-ENSMA is a founding member and committed for the aeronautic training, and several other networks such as GE4 (one or two semesters in the United- States or Russia ...), CREPUQ (programme d'échanges d'étudiants franco-québécois) supplement the list of international programs, BRAFITEC and ARFITEC.

Key figures

- 200 permanent staff
- 600 engineering students
- 100 PhD students
- 3 Masters programs (taught in French): Air and Ground Transportation, High Performance Materials and Computer Science
- 50 international academic partnerships

Life on campus

- University residences
- University restaurants
- Many clubs and associations
- Sport facilities...

