

# ENSTA ParisTech

In a word: *Ingénieur*



École Nationale Supérieure  
de **Techniques Avancées**





# A *Grande École* with a rich tradition moving forwards

ENSTA ParisTech, whose origins date back to 1741, is one of the most renowned French *Grandes Écoles* of Engineering. It offers graduate level scientific education, excellent research facilities and a broad international network. It is a founding member of ParisTech, a cluster of excellence that brings together twelve of the foremost French *Grandes Écoles* of Engineering and Management.

## FRENCH GRANDES ÉCOLES



> More than **600** students enrolled in ENSTA ParisTech Master and PhD programmes.

> **90** permanent faculty members.

> **650** lecturers.

> **6 000** ENSTA ParisTech Alumni association members.

More information on ENSTA ParisTech relocation on the Paris-Saclay Campus at [www.ensta.fr](http://www.ensta.fr)

*Grandes Écoles* of Engineering are a distinctive element of the French higher education system, which parallels the classic university system. Many of them were founded back in the 18<sup>th</sup> and 19<sup>th</sup> century with the purpose of training highly qualified engineers. Ever since, *Grandes Écoles* of Engineering have stood at the forefront of technological and scientific developments; they nowadays supply France with most of its engineers, industrial research specialists, managers and administrators.

Students of *Grandes Écoles* of Engineering are strongly selected from among the brightest science students of each generation.

The upcoming relocation of ENSTA ParisTech on the Paris-Saclay Campus (southern Paris area), at the heart of France's major scientific cluster, confirms the position of ENSTA ParisTech as a leading French institution of research and higher education in the fields of Transports, Energy, Systems Engineering, Applied Mathematics and Applied Optics.



## THE DIPLÔME D'INGÉNIEUR (MSc IN ENGINEERING)

*Grandes Écoles* of Engineering offer several Master's degree programmes, among which the *Diplôme d'Ingénieur*, the French **MSc in Engineering**. Thanks to a strong selection of the students and to the quality of the curriculum, the *Diplôme d'Ingénieur* is one of the most prestigious degrees in France. It is highly valued by companies and gets an excellent recognition in terms of career opportunities and wages.

The *Diplôme d'Ingénieur* curriculum consists of theoretical and scientific teaching with an extensive coverage of social, cultural, economic and management issues; it is based on a both broad spectrum and in-depth approach. Periods of internships in research laboratories and in companies are part of the curriculum.

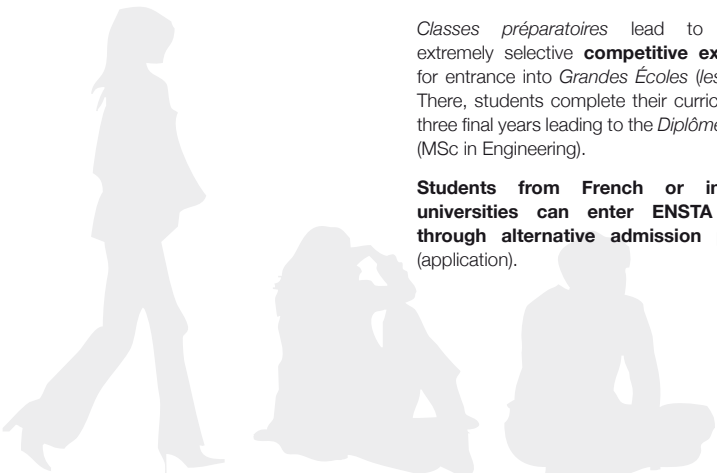
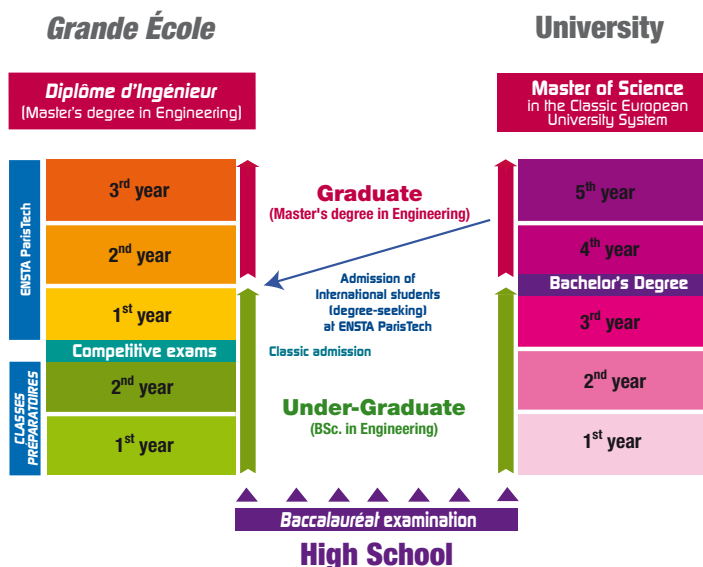
The *Diplôme d'Ingénieur* is structured as a 5-year integrated Master's programme, parallel to the classic university system:

The two first years of the curriculum are generally completed outside *Grandes Écoles*, in the very intensive *Classes Préparatoires* (35 hours/week of science courses, mostly in mathematics and physics – with same amount of personal work).

*Classes préparatoires* lead to nationwide, extremely selective **competitive examinations** for entrance into *Grandes Écoles* (*les Concours*). There, students complete their curriculum for the three final years leading to the *Diplôme d'Ingénieur* (MSc in Engineering).

**Students from French or international universities can enter ENSTA ParisTech through alternative admission procedures** (application).

## The Diplôme d'Ingénieur





# Programmes at ENSTA ParisTech

The *Diplôme d'Ingénieur* programme of ENSTA ParisTech is designed to train highly skilled systems engineers mostly active in the fields of Transports, Energy and Environment. ENSTA ParisTech *Ingénieurs* are able to conceive, implement and direct complex large-scale systems under strong economic constraints in a constantly changing international environment.

Besides the *Diplôme d'Ingénieur* (MSc in Engineering) curriculum, ENSTA ParisTech also offers Masters of Science, Advanced Masters and PhD.

## THE DIPLOME D'INGENIEUR (MSc IN ENGINEERING) AT ENSTA PARISTECH

This frequently updated programme combines high-level academic training, research projects and industrial internships and aims at developing the students' scientific and technical skills as well as their ability to innovate, to adapt and communicate. The scientific programme is completed by language, culture, law and economics courses. Courses are given by researchers from ENSTA ParisTech laboratories and by numerous auxiliary corporate lecturers, all of them familiar with leading-edge technologies.

ENSTA ParisTech therefore aims at providing all its students with a broad and solid scientific and technical background, while at the same time enabling them to further investigate a particular field. This specialisation during the *Diplôme d'Ingénieur* (MSc in Engineering) curriculum is progressive and culminates in the final year of the programme, where students can choose from among 17 advanced specialisation courses focused on industrial applications:

### ✚ TRANSPORT

- Automobile and Railway Transportation
- Maritime Transport Systems
- Industrial Engineering
- Vehicle of the Future
- Noise and Vibroacoustics in Transports
- ICT & Transports

### ✚ ENERGY & ENVIRONMENT

- Process Engineering and Sustainable Development
- Electronuclear Energy
- Offshore Resources Engineering (in English)
- Ocean, Climate & Environment
- Energy and Environment Management

### ✚ ENGINEERING MATHEMATICS & SYSTEMS ENGINEERING

- Optimization, Operational Research and Command of Systems
- Financial Mathematics
- System Modelling & Simulation
- Robotics and Embedded Systems
- Information Systems
- Systems Engineering

The broad scientific and technical background of ENSTA ParisTech *Ingénieurs* graduates enables them to work in a wide variety of sectors and to constantly evolve to new positions and sectors throughout their career.

## MASTERS OF SCIENCE

These graduate programmes are either research-based or professional. They last one or two years, according to prior qualifications or experience (minimum requirement: a Bachelor degree in the field relevant to the Master):

- Water, Soils and Waste Engineering
- Engineering and Innovation Technologies
- Master of Science in Nuclear Energy – speciality: Power Plant Design (fully taught in English).

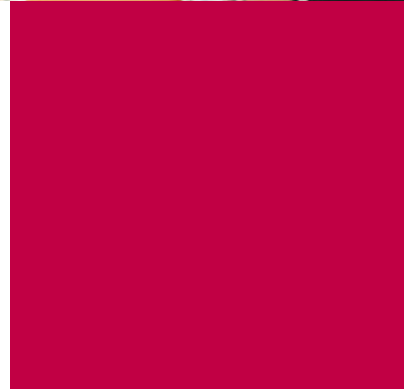
## ONE-YEAR ADVANCED MASTERS (MASTÈRES SPÉCIALISÉS)

These programmes are taught and project oriented Masters including a corporate internship followed by a professional thesis. They aim to assist students with a clearly defined professional objective in further specialisation, conversion or reorientation:

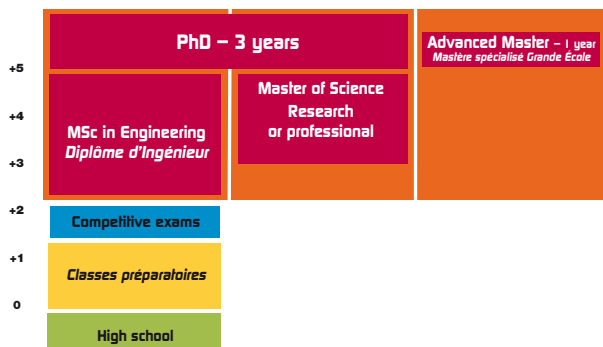
- Architecture of Information Systems
- Nuclear Engineering
- Maritime Engineering: Transport, Energy, Sustainable Development (some options taught in English)
- Electrical Vehicle Engineering.

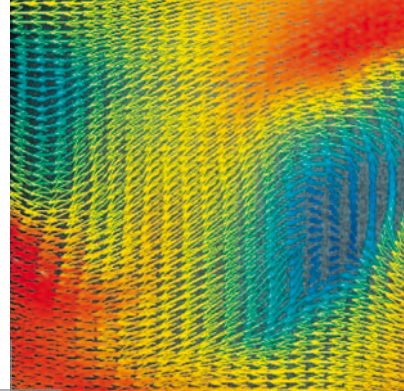
## PHD

As a leading research centre, ENSTA ParisTech offers qualified graduate students the opportunity to carry out their research in one of its research units. Doctoral programmes exist in Applied Mathematics, Fluid Mechanics, Solid Mechanics, Lasers, Electronics, Computer Science, Chemistry, Chemical Engineering and Energy.



## ENSTA ParisTech programmes





## Research

ENSTA ParisTech is committed to providing excellent research, teaching and training. It is consistently rated among the top institutions in France for the quality of its research and of its educational programmes. Several French and international distinctions have been awarded to ENSTA ParisTech researchers for their achievements.



### Research at ENSTA ParisTech in 2008/2009

- > 6 research units
- > 88 permanent faculty members
- > 84 students enrolled in PhD programs
- > 160 papers published in peer-reviewed journals
- > over 2 million € research funds from industry research contracts.

**International students** (including non French-speaking students) are welcome to apply for a PhD or a research internship (e.g. for a BSc or MSc thesis).

### II IDEA League

*IDEA League is a network of excellence bringing together Imperial College (UK), Delft U. of Technology (NL), ETH Zurich (CH), RWTH Aachen (DE) and ParisTech. II*



More information on research at: [http://www.ensta.fr/Research\\_at\\_ENSTA](http://www.ensta.fr/Research_at_ENSTA)

### A STRONG TIE WITH THE INDUSTRY

ENSTA ParisTech is home to six research units covering a large range of disciplines and dedicated to mostly applied, but also fundamental research. An important part of ENSTA ParisTech research mission is to ensure that the industry benefits from its research through the development of practical applications of its results. Research units currently conduct projects in partnership with various academic institutions and companies.

### SCIENTIFIC NETWORKS

Strong and often institutional ties with other French research institutions (CNRS, INRIA, CEA, École polytechnique and other ParisTech *Grandes Écoles*, Universities, etc.) and with foreign partners enable ENSTA ParisTech research units to operate in the framework of larger consortia.

ENSTA ParisTech is a founding member of several clusters of excellence bringing together prominent research institutions and companies of the Paris region such as the Triangle of Physics (physics) and System@tic (information systems). It participates in the development of the European Institute of Technology in close cooperation with other IDEA League research centres.

### SIX RESEARCH UNITS

#### + CHEMICAL ENGINEERING (UCP)

This unit has devoted its research activities to the study of the thermodynamics of complex fluids and the development of new ways of organic synthesis, acquiring in these fields an internationally recognized expertise. The research activities undertaken at the laboratory have various industrial applications, mostly in the fields of energy and transport (hydrogen production and storage), the petroleum and food industries, the safety of chemical processes and the resolution of economic and environmental problems.

#### + ELECTRONICS AND COMPUTER ENGINEERING (UEI)

This unit embodies the expertise of ENSTA ParisTech in the areas of electronic architectures, robotics and signal and image processing. It also largely contributes to ENSTA ParisTech's activities in computer science and engineering. The research mainly targets actions inspired by applications, mixing concepts, experiments and construction of demonstrators. Exploratory research is also conducted, either originating from fundamental problems in applications, or in the hope of major future innovations.

The essential philosophy of the laboratory is to conceive its activities in the context of realistic environments, as opposed to a virtual one on which simplifications would minimize the problems met by technologies at the contact of the real world.

#### + APPLIED MATHEMATICS (UMA)

The research activities of this unit are related to topics such as Partial Differential Equations, Dynamic systems, Optimal control, Stochastic systems, Information theory, Languages theory, Numerical methods and have applications in various domains: Electromagnetism, Elastodynamics, Aeroacoustics, Astrophysics, Quantitative Finance, Large Scale Optimisation, Cryptography, Functional Languages and more.

#### + MECHANICAL ENGINEERING (UME)

The research activities of this unit are distributed in 5 areas: Fatigue & Durability, Multiphysical & Thermomechanical Coupling (both areas with applications on modelling of shape memory alloys, simulation of welding processes, calculation of fluid-structure interactions, prediction of the thermomechanical fatigue of materials & structures), Acoustics & Vibrations, Instabilities & Turbulence (both areas with a strong expertise in non-linear vibrations, modelling of acoustic sources and turbulence) and Geophysical Fluids & Oceanography. The unit develops industrial applications in partnership with several large industrial companies, mainly in the fields of energy and railway & automotive transports.

#### + APPLIED OPTICS (LOA)

This laboratory is one of the world leaders in the field of ultra-short and ultra-intense pulsed lasers and their applications. It is heavily involved in European projects. Major developments are underway involving new projects (ultra-high intensity, sources for cancer radiotherapy using protons, and extreme ultraviolet lithography).

#### + APPLIED ECONOMICS (UEA)

This unit develops research tools and methodologies targeted to understand and to build understandable models of the economic reality. These theoretical tools are developed on the basis of industrial and public economy and are checked against actual economic facts. The unit also carries out evaluation of industrial and public economic strategies.

#### + THE INSTITUTE FOR EXTREME LIGHT (ILE)

ENSTA ParisTech hosts the Institute for Extreme Light (ILE). This collaborative project aims at implementing a ultra-high intensity laser infrastructure for the benefit of several French and international research teams, for applications in fundamental physics, medicine and material sciences.



Visit of a TGV maintenance site.

## Corporate Relations

Students in ENSTA ParisTech programmes have many opportunities to get acquainted with the corporate world and to show their technical and professional abilities through internships in companies and thanks to some 650 auxiliary professors, holding full-time engineering or management positions, who come on a daily basis to ENSTA ParisTech to transmit the students the most up-to-date knowledge and industrial know-how of their field.

Several companies participate in the school's governing bodies (Board of Administration and Education and Research Council) and through major collaborative programmes and contracts with ENSTA ParisTech laboratories.

### INTERNSHIPS

Companies welcome ENSTA ParisTech students at every stage of their curriculum for practical internships, optional one-year placements before the final year of the *Diplôme d'Ingénieur* programme or for the students' Final Degree Projects. Those internships are intended to provide the students with firsthand experiences and a broader understanding of the corporate world, preparing them to make the transition from classroom to career.

The Final Degree Project consists of a 4-to-6-month placement as a junior engineer in a company (in most cases) or in a research

laboratory. It constitutes the transition between the study period and the graduate's first job. The Final Degree Project gives students the opportunity to put into practice what they have learned at ENSTA ParisTech in the real industrial and corporate environment. It takes place under the dual supervision of a permanent research professor at ENSTA ParisTech acting as a tutor, and a scientific or technical supervisor within the host institution. Many students are hired by the company in which they carry out their Final Degree Project.

|| Throughout their curriculum, students at ENSTA ParisTech are actively confronted with the corporate world. ||

### CAREERS

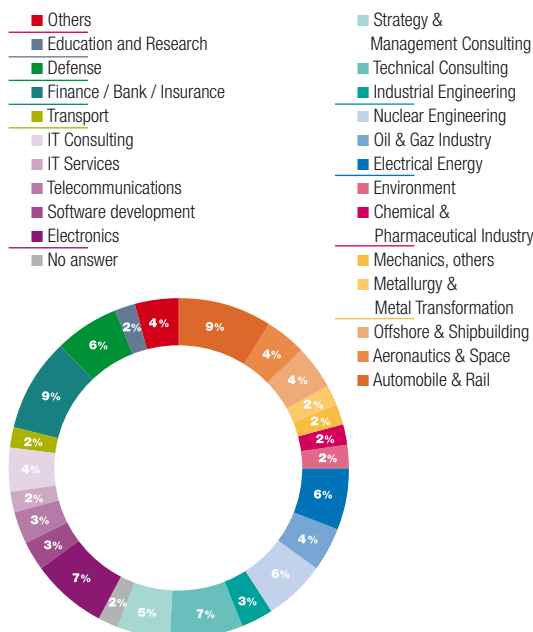
Due to the large number of specialisations in the *Diplôme d'Ingénieur* (MSc in Engineering) programme, ENSTA ParisTech *Ingénieurs* graduates work in numerous fields of activity and develop careers in all leading-edge sectors, especially the transport industry, energy, the sector of information technologies, and the sector of bank, finance and consulting.

Young ENSTA ParisTech *Ingénieurs* are much sought-after by large companies. They generally begin their careers in research & development or consulting and evolve quickly towards project management positions. Starting salaries of ENSTA ParisTech graduates are among the highest in France.

|| All the compulsory internships can be done in France or abroad, in companies or in laboratories. ||

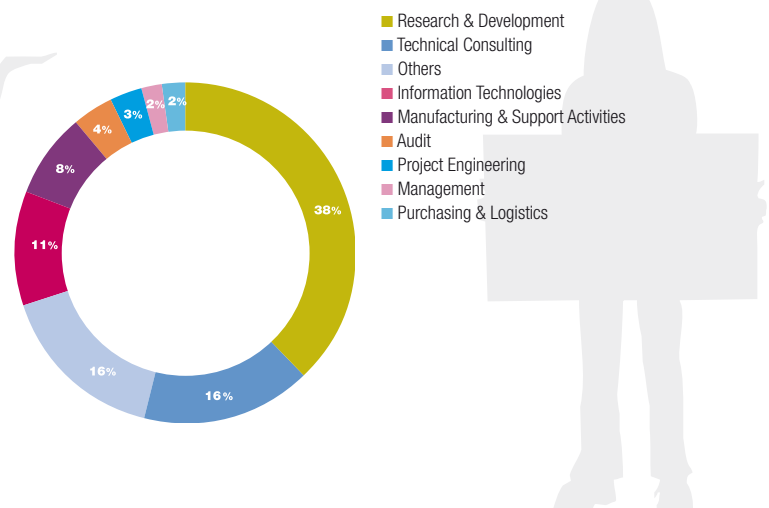
### Sectors of activity of young ENSTA ParisTech *Ingénieurs* graduates

Average data for 2004 to 2008 graduates



### Position of young ENSTA ParisTech *Ingénieurs* graduates

Average data for 2004 to 2008 graduates





## International Relations

In order to encourage and facilitate exchanges, **ENSTA ParisTech** has developed solid international relations with numerous partners worldwide. It currently has about 70 exchange agreements with international universities and a dozen agreements for double-degree exchanges.

ENSTA ParisTech takes part in several international networks such as the **T.I.M.E.** network (Top Industrial Managers for Europe), a network of over 50 major technical universities from Europe, Japan and Latin America, offering students from each university the opportunity to study and obtain degrees in various countries. ENSTA ParisTech also actively participates in the international activity of **ParisTech** such as the China, Brazil and Russia admission programmes or the ATHENS programme (one-week intensive science courses in one of the 15 European member institutions). The **BEST** (Board of European Students

of Technology) section of ENSTA ParisTech organizes every year scientific seminars for students of all over Europe.

**ENSTA ParisTech students enjoy a strong international exposure.** Opportunities to undertake an internship or follow courses abroad to complete part of the *Diplôme d'Ingénieur* (MSc in Engineering) curriculum are numerous. 6 months is the average amount of time spent by an ENSTA ParisTech student abroad throughout the *Diplôme d'Ingénieur* curriculum.



### Numbers

> More than **20%** of international students (out of ~600 students)

> Over **30** different nationalities

> **100%** of French *Diplôme d'Ingénieur* students complete an internship or a course programme abroad

> **70%** of the students complete a research internship (~3 months) abroad

> Mandatory study of English and of at least one other language (9 possibilities)

### A FEW PARTNER UNIVERSITIES & HOST UNIVERSITIES OF ENSTA PARISTECH STUDENTS DURING THEIR CURRICULUM

#### Europe, Africa

Universidad Politécnica de Madrid\*  
Universitat Politècnica de Catalunya\*  
Politecnico de Milano\*  
Politecnico de Torino  
Czech Technical University (Prague)\*  
Vienna University of Technology\*  
Wrocław University of Technology (Poland)\*  
TU München (Germany)\*  
RWTH (Germany)  
TU Berlin  
Karlsruhe Institute of Technology  
KTH (Stockholm)\*  
Lund Technical University (Sweden)  
Delft University of Technology (The Netherlands)  
Bauman Moscow State Technical University\*  
Novosibirsk State University\* (Russia)  
Boğaziçi University (Istanbul)  
NTNU (Trondheim, Norway)  
Denmark Technical University  
Imperial College (London)  
University College London  
University of Oxford  
National Engineering School of Tunis (ENIT)

#### North & South America

GeorgiaTech (Atlanta)  
University of Michigan (Ann Arbor)  
Columbia University (New York)  
University of California, Berkeley  
University of California, San Diego  
University of Toronto  
University of British Columbia (Vancouver)  
Ecole Polytechnique de Montréal\*  
Universidade de São Paulo\*  
Universidade Federal do Rio de Janeiro  
Unicamp (São Paulo)  
Facultad de Ingeniería, Universidad de Buenos Aires

#### Asia, Oceania

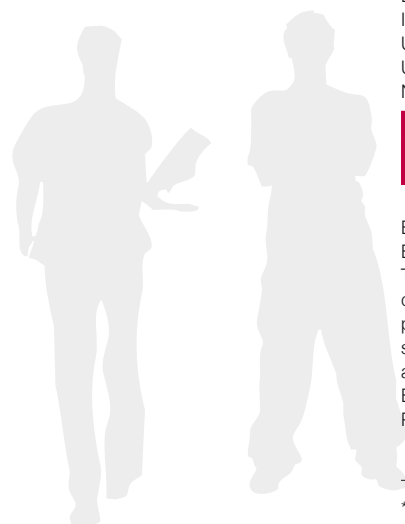
University of Kyushu (Japan)  
Tsinghua University (Beijing)  
Beijing University  
Shanghai Jiao Tong University  
Fudan University (Shanghai)  
Tongji University (Shanghai)  
Nanjing University  
Southeast University (Nanjing)  
University of Queensland (Australia)

### COOPERATION PROGRAMME WITH ENIT (TUNISIA)

ENSTA ParisTech and **ENIT** (National Engineering School of Tunis), the leading Tunisian school of engineering, have developed an ambitious cooperation programme to enable about 25 Tunisian students to graduate each year from a shared *Diplôme d'Ingénieur* (MSc in Engineering) curriculum between ENSTA ParisTech and ENIT.

Selected students start their curriculum at ENIT in a new major that offers a programme identical to the *Diplôme d'Ingénieur* programme of ENSTA ParisTech, before coming to France and integrating the regular curriculum at ENSTA ParisTech. Those students graduate from both institutions.

\* Double-degree partner universities





Rugby game at ENSTA ParisTech.

## International Students

ENSTA ParisTech has a long tradition of welcoming international students in the *Diplôme d'Ingénieur* and the other Master programmes as well as in its laboratories (PhDs and internships). More than 20% of its students are international students who give the school its vibrant international atmosphere. Thanks to the small size of ENSTA ParisTech, international students are extremely well integrated among the other students and share with them the many sports and cultural activities offered by the school.

### OPPORTUNITIES FOR INTERNATIONAL STUDENTS

Programme	Type of stay	Duration	Minimum requirement	Students need to use French
Diplôme d'Ingénieur (MSc in Engineering)	Degree-seeking	2 years (the 2 final years of the programme)	4 years of university-level studies	Yes
	Non degree-seeking (exchange students from partner universities)	1 to 2 semesters (in the 2 final years of the programme)	3 years of university-level studies	Yes (except Offshore Ressources Engineering – in English)
Masters of Science	Degree-seeking	1 to 2 years, depending on prior qualifications of experience	BSc degree	Yes (except MSc in Nuclear Energy – in English)
Advanced Master (Mastère Spécialisé Grande École)	Degree-seeking	1 year	MSc degree, of BSc + several years of professional experience	Yes (except some options taught in English)
PhD	Degree-seeking	3 years	MSc degree	No
Research Internship	For a Bachelor or Master's thesis, or a post-doctoral stay	3 to 12 months	Depending on the ENSTA ParisTech laboratory	No

### WHY STUDY ENGINEERING IN FRENCH?

A large majority of the courses at ENSTA ParisTech are given in French. Although it may appear at first sight as an obstacle to international students, the experience proves that it represents a **very high added value**.

Studying science and engineering in French makes international students at ENSTA ParisTech develop a strong knowledge of France and its language, culture, organisation and structures. This and the countless interactions with other students, teachers and school's staff members in classes, projects and student clubs make international students develop very valuable **cross-cultural**

**capabilities**. Their experience at ENSTA ParisTech will prove to their future employer their **flexibility of mind**, their **adaptability** and their **courage to challenge** obstacles.

In order to help international students meet the challenge, ENSTA ParisTech organizes an **intensive French language course** during the summer prior to the start of the courses. **French language and culture courses may be provided in several programmes** such as the *Diplôme d'Ingénieur*.

### STUDENT LIFE AT ENSTA PARISTECH

Student life at ENSTA ParisTech is very rich and lively. Participation in associations and group activities, designed to widen horizons and reinforce the quality of exchanges, is encouraged by the school.

Thanks to the small size of the school and of its strong international culture, international students get quickly integrated, and have

many opportunities to join one of the numerous sports teams or associations run by the students and to participate in the various cultural or professional events they organise.



Details about admission conditions  
<http://www.ensta.fr>

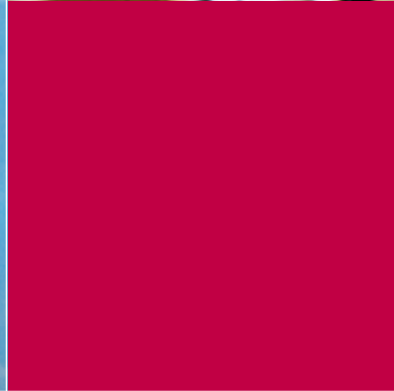


**Contacts**  
international@ensta.fr



Past and prospective international students meet and share experience on the **«ENSTA ParisTech International» Facebook group**.





for further information  
please visit  
<http://www.ensta.fr>  
or write to  
[international@ensta.fr](mailto:international@ensta.fr)



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