

Engineering

With its long tradition of excellence in training and research, French engineering evokes the great builders – Philibert le Roy and the Palace of Versailles, Sébastien Vauban and military fortifications, Ferdinand de Lesseps and the Suez canal, Gustave Eiffel and his grand metal structures (including the tower bearing his name), or Auguste Bartholdi and the Statue of Liberty. These inventors and builders have shaped the image of France.

More recently, Michel Virlogeux designed the Millau viaduct that was inaugurated in 2004, while teams of French engineers made essential contributions to innovative forms of transportation such as high-speed rail (1971) and the Airbus A380 (2005).

Trained in France's renowned *Écoles d'Ingénieurs* (engineering schools), French engineers work in all fields of engineering: logistics, telecommunications, materials, energy, information technology, civil engineering, construction, public works, agri-food, chemistry, and more. They are sought out by firms in France and abroad.

French engineering programs always include the managerial, international, and multidisciplinary aspects of the profession through the study of economics, the humanities and social sciences, communication, and culture. More and more programs are taught in English, proficiency in which is assessed prior to graduation.

Engineering by the numbers

- 800,000 active engineers in France
- 85,550 engineers hired in France (in 2012)
- 17,100 French engineers hired abroad (in 2012)
- 227 schools, a quarter of which are on university campuses
- More than 200 specializations
- €67,560 average gross annual salary and benefits

Source: IESF - www.iesf.fr

INTERNATIONAL

World-renowned French companies—Air Liquide, Alcatel Lucent, Alstom, Bouygues, Danone, Dassault, EADS, EDF, GDF Suez, Lafarge, Saint-Gobain, Schneider Electric, STMicroelectronics, Total, Veolia Environnement, Vinci, etc.—recruit many engineers in the fields of transportation, logistics, communications, materials, energy, technology, civil engineering, construction and public works, agri-food, and more.

- Created by the École Centrale, a European network of engineering schools was established for the bi-cultural training of engineers through dual degrees in engineering: TIME, Top Industrial Managers for Europe: <https://www.time-association.org>
- For European programs in engineering, the EUR-RACE label (Accreditation of European Engineering Programs) has been awarded in France since 2007 by the *Commission des Titres d'Ingénieurs* (CTI, commission on engineering degrees) to engineering courses satisfying quality criteria recognized in Europe (ENAAE program: European Network for Accreditation of Engineering Education). This label facilitates student mobility, especially within Europe. www.cti-commission.fr>Activités internationales>Activités en Europe>EUR ACE

Related fields

Aeronautics and space – Agronomy, agri-food, agriculture, viticulture, environment, and health – Defense and weapon systems – Building, construction, and public works (infrastructures, urban systems, monuments, and memorials) – Biotechnology – Chemistry – Electricity – Electronics (microelectronics, instrumentation, microtechnologies) – Energy (production, transportation, efficiency, etc.) – Manufacturing and industrialization (materials, processes, computer-integrated manufacturing, automation, robotics) – Computer science (modeling, advanced systems and networks, multimedia, telecommunications) – Engineering in the health sciences – Nanosciences and nanotechnologies – Civilian nuclear engineering – Information and communication technologies – Telecommunications – Transportation (automobile, aviation, railways, waterways, maritime)

Subfields

Bioengineering - Biomedical engineering (biotechnologies, biomechanics, biomaterials) - Civil engineering and urban planning - Hydro-engineering (geothermics, hydraulics, hydroelectric power, hydrosystems engineering) - Electrical engineering and electronics (automation, mechatronics, microelectronics, telecommunications) - Process engineering (industrial processes) - Industrial engineering (manufacturing systems, manufacturing logistics, plastics, textiles, packaging, vehicles, etc.) - Materials and surface engineering (biomaterials) - Mechanical engineering (solid and fluid mechanics, energetics, heat energy, combustion) - Engineering of rural spaces, bodies of water, and forests - Geology and geosciences

Useful links

- Admission to preparatory programs: www.admission-postbac.fr
- CTI, French national commission on engineering degrees: www.cti-commission.fr
- Community of French engineers: www.ingenieurs.com
- CDEFI, the conference of directors of French engineering schools: www.cdefi.fr
- CGE (*Conférence des Grandes Écoles*): www.cge.asso.fr
- ENI, national engineering schools: www.ingenieur-eni.fr
- *Deviens ingénieur* (become an engineer): www.deviensingenieur.fr
- ENAAE, European Network for Accreditation of Engineering Education: www.enaee.eu
- FESIC, federation of engineering and management schools: <http://fesic.org>
- Fédération Gay Lussac (federation of chemistry and chemical engineering schools): www.19ecolesdechimie.com
- University programs in engineering and engineering research: www.reseau-figure.fr
- Civil engineering, historic preservation, and engineers in France: <http://patrimoinegc.cnisf.org>
- Grandes Écoles: www.grandesecoles-postbac.fr
- EC, Écoles Centrales group: www.groupe-ecoles-centrales.fr
- GEA, Grandes Écoles in aeronautics and space: www.asp2014.ensma.fr/gea.htm
- IESF, French center of engineers and scientists: www.cnisf.org
- Institut Mines-Télécom: www.mines-telecom.fr
- INSA, national institutes of applied sciences: www.insa-france.fr
- Planète TP, the public works portal: www.planete-tp.com
- UT, network of university institutes of technology: www.3ut-admissions.fr
- Study engineering in France with the n+i network: www.nplusi.com
- Network of schools of engineering polytechnics: www.polytech-reseau.org
- UGEI, union of independent Grandes Écoles: www.ugei.org

CHOOSE YOUR PROGRAM

- Campus France program catalogue: www.campusfrance.org>Trouvez votre formation
- Programs taught in English: www.campusfrance.org>Programs Taught in English
- CampusBourses, financing your studies in France: <http://www.campusfrance.org>>Financez vos études

Licence level

Brevet de Technicien Supérieur (BTS, technical certificate) (Secondary diploma + 3 years of higher education) – L2

The BTS ATI (engineering technical assistant) is offered by private and public secondary schools. The program consists of technical coursework and hands-on learning (internships). BTS graduates may elect to apply to a school of engineering directly on the basis of their BTS record or by completing a preparatory course and earning the ATS (*adaptation technicien supérieur*) and then passing the entrance exam required by certain Grandes Écoles.

It is also possible to earn a professional *licence* at a university.

Preparatory programs

There are three types of preparatory programs:

- CPGE (Grande École preparatory course), a 2-year program offered by secondary schools that prepares students for the entrance exam required for admission to Grandes Écoles of engineering.
- Integrated preparatory courses are available at some 60 engineering schools (offering 150+ programs with space for 9,500 students). These admit secondary graduates into their in-house preparatory programs, with policies and procedures unique to each institution.
- Common preparatory programs used by 80 schools:
 - Cycle Préparatoire Polytechnique: www.la-prepa-des-inp.fr
 - CPI (integrated preparatory programs) administered by networks of schools: www.19ecolesdechimie.com
 - University-based science preparatory programs for applicants to Grandes Écoles
 - PeiP, for the Polytech network of engineering schools: www.polytech-reseau.org

Licence

(Secondary diploma + 3 years of higher education) – L3

Professional licences in “sciences, technologies, and health”

Accessible after 2 years of higher education, this career-oriented *licence* (2 semesters, 60 ECTS credits) allows students their choice of 16 different specializations, such as computer science, industrial production, plastics, energy, biotechnologies, or construction). The curriculum includes a mandatory internship.

Professional licences in “sciences, technologies, and health” with a concentration in engineering

Offered by most French universities, this *licence* (6 semesters, 180 ECTS credits) enables students to acquire basic knowledge in engineering in preparation for admission to a university master's program or to a school of engineering. After one or two semesters, depending on the university, students may choose a specialization (electronics, mechanics, computers, etc.).

- www.campusfrance.org>Trouvez votre formation>Licence

Master level

Master

(Secondary diploma +5 years of higher education) – M2

Diplôme/Titre d'Ingénieur (professional qualification, master equivalent)

For students who have completed 2 years of study (a preparatory program in science, BTS, or equivalent), the 3-year engineering program begins with 2–3 core semesters to deepen students' mastery of mathematics, physics, mechanics, electronics, and other key subjects.

The *diplôme d'ingénieur* is the professional qualification for practice as an engineer in France. It is a national diploma recognized as the equivalent of a national master (120 ECTS credits). Holders of the degree may apply to doctoral programs. Institutions accredited to confer the *diplôme d'ingénieur* are reviewed every 6 years by CTI, the French national commission on engineering degrees.

- www.cti-commission.fr>Chercher un programme d'ingénieur habilité

French engineering programs embrace the managerial and international dimensions of the profession through multidisciplinary instruction that includes the humanities, the social sciences, management, communication, and international studies.

Close links between schools of engineering and corporations open many internship opportunities. Students may elect to spend a year working for a firm in France or abroad between the first and second years of the engineering curriculum. The nature of their work may be research, analysis, or expert consulting.

Knowledge of English is required. Some engineering schools also require a second or even a third foreign language.

- Information on master's degrees in engineering in France:

www.campusfrance.org>

Espace documentaire>Offre de formation>Fiches diplômes

NOTE

The French *diplôme d'ingénieur* is recognized as the equivalent of a U.S. *Master in Engineering* by the American Association of Collegiate Registrars and Admission Officers (AACRAO) and appears in AACRAO's Electronic Database for Global Education: <http://edge.aacrao.org>

Master

Universities and engineering schools both offer programs leading to a 2-year master in engineering. Applicants must have completed 3 years of higher education.

Holders of a master may apply to a doctoral program.

- www.campusfrance.org>Trouvez votre formation>Master
- Engineering programs (20 universities): www.reseau-figure.fr >L'offre de formation>Le guide des formations

Beyond the master level

Mastères Spécialisés (MS, specialized master) (M2 +1 year of higher education) – post-M

About 15 1-year *Mastère Spécialisé* programs open to holders of a master's degree or the equivalent (including the *diplôme d'ingénieur*) and labeled by the *Conférence des Grandes Écoles* enable students to earn an institutional credential attesting to dual competence in engineering.

Thirty different *Mastère Spécialisé* programs in various cutting-edge areas are taught wholly or partly in English.

Costs of such programs vary widely and may exceed several thousand euros per year.

- Information on MS degrees:

www.campusfrance.org/fr/ressource/les-mastères-specialises-ms

- List of MS programs: www.cge.asso.fr/nos-labels/ms

Specialized training programs

Some engineering schools offer 1- and 2-year programs that enable holders of a *diplôme d'ingénieur* to earn a diploma accredited by CTI.

Doctorate

(M2 +3 years of higher education)

Holders of a master or *diplôme d'ingénieur* may apply to a doctoral program.

About a dozen French doctoral departments focus on some aspect of engineering, preparing graduate students for careers in public and private research organizations or in corporate R&D.

Research is performed in a variety of disciplines and fields—among them aeronautics, automation, bioengineering, instrumentation, nanotechnologies, computer-aided manufacturing, robotics, and systems.