

NUCLEAR HIGHER EDUCATION IN FRANCE

- Running parallel to its universities, France has a system of elite higher education institutions known as *Grandes Écoles*, which are seen as the training ground for leaders in industry and government.
- The *Diplôme d'Ingénieur* or Engineering Diploma, which gives the holder the right to bear the title of *Ingénieur* or Engineer, is a more prestigious degree than a Bachelor's or Master's in France
- An Engineering Diploma specialized in nuclear science and engineering is offered only by a few institutions, notably the training arm of the CEA, the *Institut National des Sciences et Techniques Nucléaires* (National Institute for Nuclear Science and Engineering)

Preparation for French Higher Education

The final secondary school examination in France is called the *baccalauréat* (baccalaureate) or *bac*, and is equivalent to English *A levels*, American *SATs* or *ACTs* and German *Abitur*. Students taking the baccalaureate tend to opt for one of three streams: Sciences; Social Sciences; Letters (literature and foreign languages). Whichever stream is chosen, students cover a broad range of subjects, including science, maths, literature and languages. Successfully completing the baccalaureate – as around 80% of students do – entitles a student to enter university.

University v *Grande École*

After the baccalaureate, a French student decides whether to enter university or to pursue further intensive study to enter one of the *Grande Écoles*. This preparatory study usually lasts two years and is followed by highly competitive examinations. The highest-ranked students at these exams enter the most prestigious *Grandes Écoles*.

University

After three years' study at university, students can obtain a *licence*, the equivalent of a bachelor's degree. Over the next two years, they prepare a master's degree, which can either be research or professionally-oriented. It is at the university level that the French higher education system is becoming more harmonized with other European countries, under the framework of the Bologna Process (see http://www.eurydice.org/ressources/eurydice/pdf/0_integral/085EN.pdf). Changes include the modular organization of degrees and the awarding of credits.

Grandes École

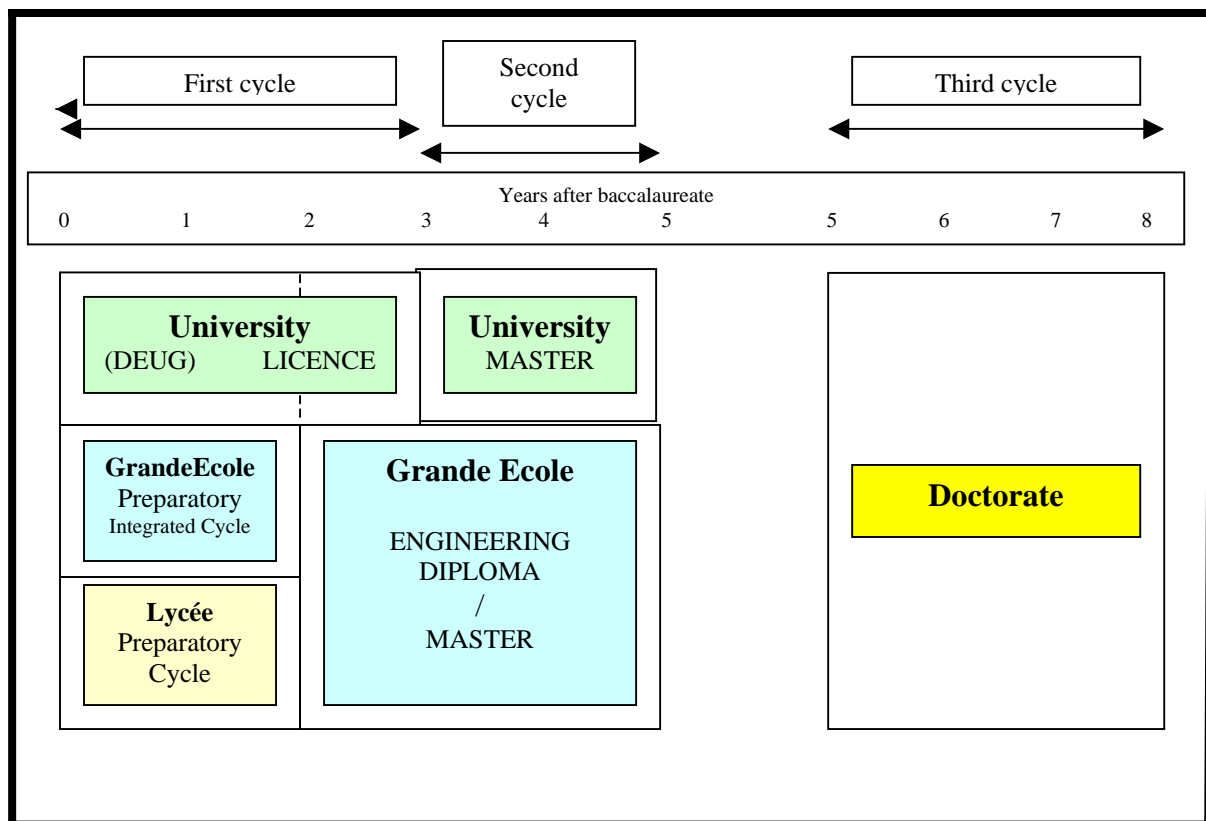
Many *Grandes Écoles* were founded back in the 18th and 19th centuries with the purpose of training highly qualified engineers to build France's economy. For this reason, they are often called "engineering schools" although there are also *Grandes Écoles* of management.

Unlike universities, which are comprehensive educational institutions with different faculties, *Grandes Écoles* are smaller in size and offer fewer degree options. The curriculum – while far from uniform - includes many more disciplines than at universities where specialization comes earlier: for example, students may well have to cover French culture and philosophy as

part of an Engineering Diploma. In many cases, the third year of studies can be devoted to a specialization e.g. nuclear engineering.

Employers in general prefer students that have graduated from *Grandes Écoles* and compete heavily for those coming from the very top schools, as they would for students from Oxford or MIT. A list of the top ten schools as rated by the French magazine *Challenges* is listed in Annex 1.

Grandes Écoles of engineering award the very prestigious *Diplôme d'Ingénieur* or Engineering Diploma. It is a qualification more valued by employers than a Master's or Bachelor's degree, and is strictly supervised by a government body, the CTI (*Commission des Titres d'Ingénieur* or Commission for the Engineering Diploma). These days, students have the opportunity to prepare a master, in parallel with their Engineering Diploma, in order to pursue their studies towards a doctorate (PhD) if they wish.



Overview of the French Higher Education System divided into three cycles

Other routes to an Engineering Diploma

It is possible to become an Engineer through further education. This is the route taken by those who interrupt their studies, whatever the reason, and who want to improve their qualification level while continuing to work. The most important institution in France offering such opportunities is the CNAM, *Conservatoire National des Arts et Métiers*. CNAM even offers a Engineering Diploma specialized in nuclear science and engineering. It should be noted that few people achieve Engineer status through this route.

Some universities are also qualified by CTI to award their students an Engineering Diploma.

Doctoral Level – the Third Cycle

Doctoral degrees can be pursued at universities, *Grande Écoles* or at certain accredited public institutions. As a rule, a PhD is awarded after three years of research, and includes a thesis defence.

External Evaluation

Two bodies are in charge of external evaluation of higher education: AERES (*Agence d'évaluation de la recherche et de l'enseignement supérieur* or the Agency for the Evaluation of Research and Higher Education) and the aforementioned CTI.

***Diplôme d'Ingénieur en Génie Atomique* (Engineering Diploma specialized in nuclear science and engineering)**

The main ways open to French students seeking such a diploma are:

1. Through the *Institut National des Sciences et Techniques Nucléaires* (INSTN), which is the training arm of the CEA (Commissariat A L'Energie Atomique). Certain Grande Écoles have a convention with INSTN, whereby students spend their final year at one of its three centres: Saclay (near Paris); Cadarache (Provence) or Cherbourg. A list of Grandes Écoles with such a convention can be found in Appendix 2
2. Certain *Grandes Ecoles* offer a nuclear option internally during the third and final year. The list of schools validated to award the diploma in *Génie Atomique* can be found in Appendix 3
3. A third way is through further education. The most important institution in France offering such opportunities is the CNAM, *Conservatoire National des Arts et Métiers*.
4. University students, even those qualified to Master's level, are not entitled to enter INSTN's *Génie Atomique* programme. Having completed a Bachelor's degree, they would need to reapply to an Engineering school.

Useful Websites:

http://www.eurydice.org/ressources/eurydice/pdf/0_integral/085EN.pdf (Bologna Process)

<http://www.enen-assoc.org>

http://ec.europa.eu/research/energy/fi/fi_cpa/other/article_2532_en.htm

<http://www-instn.cea.fr/>

<http://www.cnam.fr/> et http://formation.cnam.fr/index_theme.php

Appendix 1:

Ranking done by a French magazine ("Challenges") in 2006, based upon five criteria: initial salary (40/100), selection of the students (20/100), professional integration (20/100), relations with companies (10/100), international openness (10/100)

0. Ecole Normale Supérieure de Paris (out of classification, because it's not an engineering school; scientists attending this school, however, benefit from the best reputation, and may expect a brilliant career)

1. Polytechnique - Paris

2. Mines - Paris

3. Supélec - Paris

4. Mines - St Etienne

5. Centrale - Paris

6. Ponts et Chaussées - Paris

7. Télécom - Paris

8. ENSG - Nancy

9. Mines - Nancy