



References and Guidelines

*Adapted English version of the document
"Références et Orientations" (2009)*

April 2010

Introduction

In 1934, the French law that created CTI (*Commission des Titres d'Ingénieur* - Engineering Degree Commission) set up the first, or at least one of the first, evaluation and accreditation structures in France and Europe. More and more of these structures were set up in the field of career-oriented higher education (e.g. business schools). Starting at the Bergen Summit of European ministers held in May 2005, the subject went beyond the national career-oriented framework, since it is now extended to the entire European higher education system, supported by structures and bodies in charge of evaluating national agencies and granting them accreditation.

The general aim of this process is to:

- Constantly improve higher education degree programmes, including engineering schools, by seeking out a high level of quality,
- Give them formal national and international recognition before employers, students and their families.

External evaluation is the first stage that measures how an establishment or an organisation performs in comparison with its objectives. A requirement for this stage is that these objectives are defined. Accreditation is the next stage that leads to a compliance certificate, a label with regards to a reference system and criteria. This reference system must also be defined. At national and international level, self-evaluation is now considered to be the key element to quality management for higher education establishments. It must be done alongside the external evaluation.

The 1934 law, which was confirmed in June 2000 in the French Education Code, calls for the external evaluation and accreditation of French engineering schools to be done by CTI (*Commission des Titres d'Ingénieur*). On their request, CTI can also perform the evaluation and accreditation of establishments abroad that grant foreign engineering degrees. Since the resulting opinion on accreditation may, upon the concerned governments' request, result in "State admission" of these degrees. This admission confers the engineering graduate the right to use the title of "ingénieur diplômé" in France. It is drafted by the minister of higher education.

The "References & Guidelines" document is primarily aimed at engineering schools in France and abroad, and serves as a reference document for their accreditation by CTI and their habilitation by the French government to deliver the "*Diplôme d'ingénieur*". **This version of the document is a translation and adaptation of the original French document "Références et Orientations". Some contents have been condensed (those that have been judged to be of a limited interest to the international public) whereas others have been extended** (particularly, the details on the criteria and procedures applied to the institutional accreditation of international degrees or CTI criteria on joint and double degree programmes).

This document is the result of the experience gained by CTI since 1934, more specifically during the past two decades, due to the considerable increase in the number of engineering degree programmes. It is designed as a framework within which the Engineering Schools have ample room to make their own initiatives and innovations: in particular, the Engineering Schools should define their duties and responsibilities themselves, as well as the skills they want to see in the engineers they train.

CTI has also brought these guidelines into phase with those given in documents by national, European and international higher education evaluation organisations¹, in particular, those concerning engineers.

Together with "References and Guidelines" CTI has produced two other documents: the "Complements to the References and Guidelines Booklet" ("*Cahier Complémentaire*") and the "Engineering Degree Self -Evaluation Guide" ("*Guide d'autoévaluation*"). The English version of the "*Cahier Complémentaire*" has not been released, as an effort has been made to include all relevant information to the international public in the document "References and Guidelines". As for the Guide, a condensed English version is available at the CTI's English web site . The full French version of these documents is accessible at: <http://www.cti-commission.fr/>.

¹ *Standards and Guidelines for Quality Assurance in the European Higher Education Area - 2nd edition (2007) or ESG*

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A. INSTITUTIONAL ACCREDITATION OF FRENCH ENGINEERING SCHOOLS AND THE NATIONAL AND THE EUROPEAN CONTEXT

A.I THE EUROPEAN HIGHER EDUCATION AREA

International context

In a globalised world that is quickly changing and evolving, higher education now aims to help develop a knowledge-based body that makes a contribution to society and to the economy.

Europe has undertaken construction of the European Higher Education Area. There are two compound parts to this process, one conducted under the Bologna process (currently with 46 participating countries) from the 1998 meeting held at La Sorbonne, the other within the framework of the European Union (27 member countries).

In parallel to their actions that work towards improving education in Europe and developing students' and graduates' mobility, primarily fostered by making degrees and training programmes comparable, these European bodies have promoted quality in evaluating these degree programmes.

As part of this, over the past ten years, they have laid the methodological and organisational foundations for a complete quality assurance system in the field of higher education. They now offer methods that encourage the development of quality assurance, both for higher education establishments and for the agencies that evaluate the establishments and/or programmes. This led to the "European Standards and Guidelines" (ESG)² drafted by ENQA (European Association for Quality Assurance in Higher Education) and approved in the Bergen Summit of European ministers in 2005. One recent European initiative (meeting in London in May 2007) was launching the creation of a register of agencies that meet these standards: EQAR (European Quality Assurance Register).

CTI has been a member of ENQA since 2005. The methods and criteria for the accreditation and institutional accreditation of engineering degree programmes and their application, as presented in this document, were given in accordance with these European standards.

In parallel to ENQA's work, but in a more operational fashion, there are organisations working to have these principles implemented. ECA (European Consortium for Accreditation), of which CTI is a founding member, works towards mutual recognition of evaluation and accreditation results.

In the engineering field, EUR-ACE (European System for Accreditation of Engineering Education) has set the objective of defining standards that are specific to the engineering field, in particular in terms of the skills that future graduates need to acquire. A brief description of the EUR-ACE system is provided in section B. VI.

CTI is one of the 7 agencies in Europe that are entitled (in 2010) to deliver the EUR-ACE label.

Terminology

The recent founding of the European Higher Education Area helped formalise the ideas and concepts that were lacking in older legislative texts but that are necessary to drafting shared international reference systems. To define CTI's duties and responsibilities, the following terms had to be used, in particular for the field of higher education. These terms are recognised internationally, specifically by ENQA³.

Evaluation (cf. "evaluation" in ENQA terminology)

An examination procedure established to determine how much an existing process, service or institution meets the appropriate level of quality or specific requirements. It is one of the basic elements of quality assurance. Reference systems may come from different sources (government texts, European or international sources, internal rules, continuing improvement, etc.).

² http://www.enqa.eu/files/ESG_v03.pdf
³ <http://www.enqa.eu/files/ENQAmodels.pdf>

Accreditation (cf. ENQA terminology)

Guarantee given by a competent or recognised body that a future or existing programme of study, service or higher education establishment meets quality standards. These standards may be entirely or partially established by the profession that corresponds to the students' degree programme. Accreditation is decided according to compliance with the selected standards and may be given along with recommendations.

Institutional accreditation⁴ (“habilitation”) (cf. ENQA terminology)

Act by which an authority grants legal capacity to an individual or an organisation, such as a school granting an engineering degree.

A.II MISSION AND STATUS OF CTI

The Engineering Degree Commission (CTI, “Commission des Titres d’ingénieur”) is a non profit organisation officially recognised as the independent body in charge of performing establishments' accreditation to grant engineering degrees in France.

Its creation, mission and responsibilities were established by the laws of 10 July 1934 and 26 January 1984, included in the French Education Code, and their application decrees.⁵

In order to fulfil its mission, CTI performs a periodic evaluation and accreditation of the Engineering Schools (generally, every 6 years). Upon the result of CTI's accreditation, the Engineering Schools are institutionally accredited (“habilitated”) to deliver the Engineering degree (“Diplôme d’ingénieur”) by the concerned Minister(s) (see paragraph “Duties and responsibilities” in the next section).

In April 2006, another organism in the field of evaluation of higher education was created in France: *The French Agency for the Evaluation of Research and Higher Education*⁶ (AERES). The agency is divided into three sections that evaluate the following, respectively: establishments (section I), research (section II) and training programmes (section III).

The relationship of CTI with the *French Agency for the Evaluation of Research and Higher Education*⁷ (AERES) was defined in the decree of 3 November 2006, which stipulates that AERES may draft an opinion on the quality of the evaluation procedures implemented by CTI.

Nevertheless, the responsibilities of CTI as to the accreditation of engineering degree programmes have not changed after the creation of AERES. Both agencies coexist and cooperate in order to fulfil their respective missions. The common concern for quality in higher education and the goal of avoiding overloading the establishments motivate AERES and CTI to coordinate their activities and to communicate with each other on their information and files, in agreement with the engineering schools.

A.III CTI'S DUTIES AND RESPONSIBILITIES

CTI's scope covers all French or foreign engineering degree programmes aiming for accreditation or institutional accreditation (“habilitation”) to deliver the French “Diplôme d’ingénieur”. CTI's duties and responsibilities include:

⁴ In France, the term “habilitation” is applied instead of “institutional accreditation”

⁵ Since 1934, CTI's role and activities have been defined by the following texts: law of 10 July 1934, on the conditions for granting and using engineering degrees, establishing CTI, included in articles L. 642-1 to L 642-12 of the French education code, law of 26 January 1984, on higher education (articles L123-1 to 123-9 and L 711-1 to L 719-11 of the French education code), decree no. 85-685 dated 5 July 1985, on CTI's membership and organisation,., decree no. 99-747 dated 30 August 1999 amended by decree no. 2002-604 dated 25 April 2002 on the creation of master's level degrees, decree no. 2001-242 dated 22 March 2001, on (periodical) institutional accreditation to grant engineering degrees, decree no. 2006-1334 dated 3 November 2006 on AERES's organisation and operation.

⁶ <http://www.aeres-evaluation.fr/>

⁷ <http://www.aeres-evaluation.fr/>

1. The evaluation and accreditation of all French engineering schools that would like the institutional accreditation (“habilitation”) to grant engineering degrees (“Diplôme d’ingénieur”). Public schools are institutionally accredited by the concerned minister(s) upon reception of CTI's opinion. Private schools are institutionally accredited by the concerned minister(s) upon reception of CTI's decision.
2. On their request, the evaluation and accreditation of establishments abroad that grant foreign engineering degrees. Since the resulting opinion on accreditation may, upon the concerned governments' request, result in "State admission" of these degrees. It is drafted by the minister of higher education.
3. The formulation of opinions on all issues related to engineering degrees. In particular, CTI prepares the criteria and procedures necessary to carrying out its work, including granting engineering degrees. It helps to continually improve engineering degree programmes and to integrate them at European and international level.

To meet these objectives, depending on the law, CTI may investigate an engineering training establishment in accordance with the character of its work.

Through this work, and given the way it is organised, its experience and its regular visits to schools, CTI guarantees the quality of engineering degree programmes and ensures that they are always adapted to the European and international context and to the academic and professional worlds.

It does not perform individual certification, i.e. grant engineering degrees. It does not list rankings of schools.

CTI is the *de jure* and *de facto* cornerstone of engineering degree programme accreditation in France, and therefore institutional accreditation.

A.IV CTI'S STRATEGIC PRIORITIES AND POLICY

In order to improve the quality of engineering degree programmes as well as the quality of CTI's services to schools, companies, engineering students and society as a whole, CTI aims to make progress in the following areas:

1. Ensuring that engineering degree programmes meet the demands of society and the economy, by monitoring their scientific and professional nature,
2. Ensuring that training programmes are open to innovation and research, to corporations and to international horizons,
3. Developing cooperative and consultative relationships with schools, education ministries and organisations that work with engineering degree programmes, in France or abroad,
4. Ensuring that French engineering training programmes fulfil their role for master's level degrees in French higher education and within the European education area. CTI's objectives for European accreditations and mutual recognition are a fully-fledged part of this objective.
5. Making quality assurance more professional and more systematic. This objective concerns schools and CTI itself.

A.V CTI'S MEMBERSHIP

CTI is a unique case in the landscape of the evaluation of higher education in Europe, as its composition is completely equitable in terms of professional and academic participation. CTI's members are chosen according to its original principles and the regulatory texts of 1985. CTI has 32 members, appointed upon legislative order, including:

- Four members selected from the staff of scientific, cultural and professional public establishments connected to the national education ministry and that grant engineering degrees
- Four members selected from the staff of schools and institutes connected to the national education ministry and that grant engineering degrees;
- Eight members selected for their scientific and technical skill, including at least five from the staff of establishments that grant engineering degrees, not including public establishments connected to the national education ministry;
- Eight members selected from the most representative employer organisations;
- Eight members selected by the most representative professional engineering associations and unions.

Under this structure, each member has equal say. It brings together individuals from engineering education, the professional and corporate world, top labour organisations and engineering associations as well as experts in the field.

The names and affiliations of the members of CTI are published at its web page: <http://www.cti-commission.fr>

B. ENGINEERS AND ENGINEERING DEGREES IN FRANCE

B.I THE ENGINEERING PROFESSION IN FRANCE

A. Overview

Engineers are high-level scientific and technical workers with the competences needed to supervise, manage and lead engineering work, which consists in coordinating, implementing and developing the competences needed to make objects, systems or services that generally meet a need or a market imperative in a competitive environment.

It is now commonly accepted that there have been engineers in France for more than two centuries. This field has a long history, which has changed along with society. Engineers now play a major role in society and the economy, influencing how they develop.

Developments in engineering have shown that major technological breakthroughs cannot occur without combining a broad skills base and accounting for the economic, industrial, societal and environmental issues at stake. For this reason, engineering sciences, as they are broadly defined, are eminently cross-disciplinary. They are defined according to their objectives, their functions and their methods.

In the French corporate world, over one million executives are classified as engineers. Some of them may have non-engineering degrees from universities or on-the-job training, but more than 600,000 of them⁸ received these degrees after their initial or continuing engineering education.

The French engineering degree system grants around 30,000 degrees each year. In addition to this, around 1500 engineering degrees from abroad are officially recognised by the French government.

This number has increased regularly over the past 50 years. There are currently not enough engineers who can work on new technological developments, drive or support growth, and replace retiring engineers to meet companies' and administrations' needs.

In France, engineering degree programmes are offered mainly by Engineering Graduate Schools. In most engineering training programmes, there is a predominant specialty that often corresponds to a corporate sector, sometimes to a certain discipline, but in all cases, engineers are trained according to a broad, multi-disciplinary scientific basis, with a sharp focus on methods, tools and the industrial environment or framework.

Continuing professional education is particularly important to keep engineers up-to-date on the profession, primarily due to the fast changes that can occur in science and technology. It also helps engineers move forward in their careers. Given the broad range of engineering positions available and the community's needs, many engineers expand their skills base throughout their careers and move on to positions in management or administration.

CTI's definition of the engineering profession

Even if there are several professions under the engineering umbrella, CTI has adopted the following global definition of the engineering profession:

The engineering profession consists in asking and answering complex questions in an effective, innovative way, in the fields of creation, design, production, implementation, within a competitive environment and with a focus on products, systems or services, and possibly their financing and sale. As such, engineers should have a good understanding of technical, economic, social and human issues, based on a solid scientific background.

Engineers primarily work in industry, construction and public works, agriculture and services.

The profession puts people at work on technical and financial issues, often in an international context. It tackles concerns related to the protection of people, all life forms and the environment, or, put broadly, collective well-

⁸ Cf. CNISF directory (CNISF.org)

being. It helps make companies more competitive, especially through the use of technology, and active longer in today's globalised world. It is economically and socially endorsed.

Engineering disciplines

Engineers work in a wide range of disciplines. CTI has developed the following classification:

- 1) Basic and applied research
- 2) Engineering studies, consulting and expertise,
- 3) Production, operation, maintenance, testing, quality, safety,
- 4) Information systems,
- 5) Project management
- 6) Customer relations (marketing, sales, customer support),
- 7) Management, human resources,
- 8) Training.

In general, engineers move ahead in these disciplines throughout their careers. They often start with disciplines 1, 2, 3 or 4; then move on to disciplines 5 or 6; before working in discipline 7. They may work in discipline 8 to some extent throughout their careers.⁹

Main engineering fields

The engineering work is done in thematic scientific, technical or industrial fields sometimes related to the positions held, but more often related to the company's or organisation's business sector.

CTI has defined eleven main thematic fields:

- 1) Agriculture, Agronomy, Food industry,
- 2) Chemistry, Chemical engineering,
- 3) Biological engineering, Medical engineering,
- 4) Earth sciences,
- 5) Materials,
- 6) Civil engineering, Construction, Urbanism, Environment,
- 7) Mechanics, Energy,
- 8) Electricity, Electrotechnical engineering, Automatics
- 9) Electronics, Telecoms and networks,
- 10) Information Technologies, Information systems, Mathematics, Modelling,
- 11) Industrial engineering, Production, Logistics.

Some sectors may overlap several fields (transport, aeronautics, etc.). These engineering fields are also increasingly broader. The related fields of architecture, plastic arts, art production, healthcare and finance could also be added to this list.

B.II THE STRUCTURE OF ENGINEERING DEGREE PROGRAMMES IN FRANCE

Engineering degree programmes and the French higher education system

Engineering degree programmes ("*Diplôme d'ingénieur*") aim to provide students with the knowledge, capacities and theoretical and practical skills necessary for engineering work over five years after the baccalaureate degree. Since these training programmes are career-oriented and since all establishments are different and encouraged to be diverse, engineering degrees are established within each establishment rather than at national level.

Engineering degree programmes are part of the French higher education system that includes all public and private post-baccalaureate degree programmes.

⁹ See CNISF (*Conseil National des Ingénieurs et des Scientifiques de France*) Surveys

Higher education establishments include universities, which primarily focus on general education, and graduate schools and institutes, which are more specialised and include engineering graduate schools, business schools and management schools.

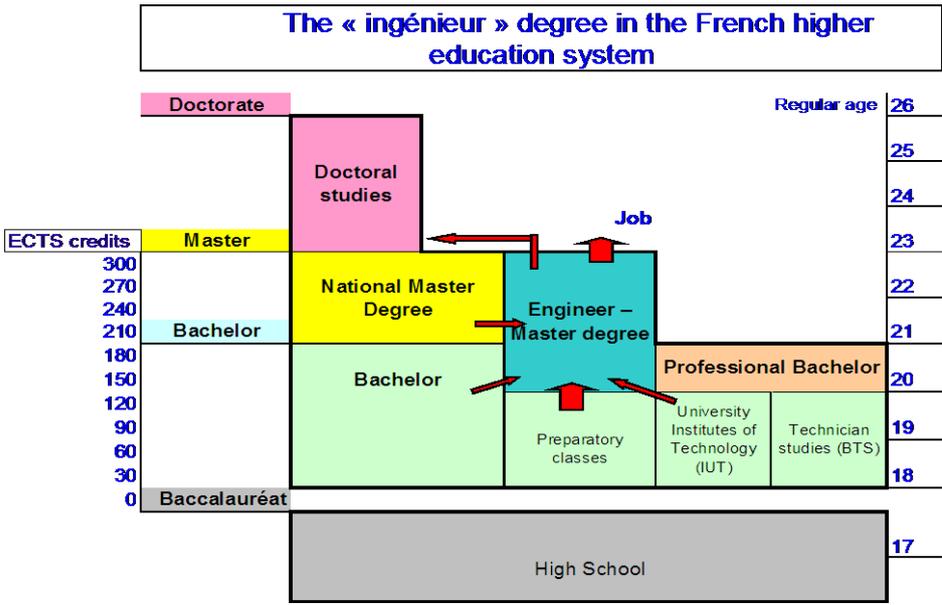
In principle, universities are open to all baccalaureate degree-holders. Career-oriented schools are selective, as are most career-oriented university programmes (often accessible after taking an initial course open to all baccalaureate degree-holders: medicine, law, education... and engineering).

In recent years, the higher education system was brought into line with the Bologna process guidelines, and the curricula were reorganised.

To meet the needs of society, companies and engineering students, the engineering degree programme was gradually diversified, both in terms of how engineering students are recruited and of the type of training.

It is, however, consistent overall, and aims to be visible and easy to understand at national and international level, which CTI works to ensure.

In France, engineering degree programmes are included in the higher education system as follows:



They are often organised into an initial two-year course of study followed by a second three-year course of study in an engineering school.

After the baccalaureate degree, students may take different courses to prepare for engineering degrees: two years in CPGE (*grandes écoles* preparatory classes) and entrance exams, two years in engineering school preparatory courses, two years of IUT (technological university institute) or scientific university (general or possibly professional bachelor's degree) training then test or application entrance exam. Most graduate schools are open to all types of applicants, but each school has its own preferred application system.

Most of French engineering graduate schools' students come from preparatory classes, but former CPGE students are no longer in the majority: many students now come to engineering graduate schools from integrated preparatory courses and increasingly from IUTs.

In addition, a large portion of students, in particular international students, are recruited through exam-based applications.

After obtaining an engineering degree, most young engineers immediately start jobs, and some continue their education to get another degree, perhaps in a more advanced technical specialty (cf. specialty engineer) or in sales or management.

Some of these graduates go on to doctoral studies in France or abroad, immediately or later on, in varying proportions depending on the field.

Engineering graduate schools in France

The engineering education system in France has a long history, and it has developed greatly over the years while still holding on to its basic principles.

Engineering graduate schools were initially set up by the State to train engineers for State-sponsored work, first for the military, then for civilian sectors (currently Defence, Equipment, Transport, Industry, Telecommunications, Agriculture), then by the private sector, with financing coming mainly from private sources, or by the Chambers of Commerce and Industry; more recently, in the last decades, most of these graduate schools are founded by the ministry of higher education.

An engineering graduate school can be defined as a clearly-identified and recognised structure that benefits from full autonomy in terms of its organisation and teaching methods, with a solid governance set-up. Its primary role is training engineers, and it has all the resources it needs to carry out this role.

Schools are organised in line with the professions their training programmes prepare for: solid management, their own resources, close, established cooperation with their professional environment to set educational objectives, selective recruiting methods, a significant percentage of engineers on the faculty, theoretical and practical teaching methods, the professional nature and the type of the degrees they grant.

The schools differ in their types of engineering programmes, which is particularly important to prospective students and future employers.

They have their own legal status, being either public or private or integrated into other establishments, generally larger higher education establishments. However, they are very open and form different types of partnerships.

Engineering graduate schools abroad and international education

As degree programmes become more global in scope, foreign schools and universities are setting up in France, and French schools are setting up locations abroad. Some fully-foreign schools and universities also request the CTI accreditation.

Many schools in France have cooperation agreements with equivalent degree programmes abroad, and they may grant degrees to international students who did some of their training in France. These initiatives very frequently adopt the form of double degrees or joint degrees (see section B.II and B.III).

These French and foreign programmes, and the degrees or qualifications they grant, require different types of recognition, which we will examine later on in the document.

B.III THE MAIN TRACKS TO AN ENGINEERING DEGREE IN FRANCE

Student-status programmes, with traditional teaching methods

Under this training method, which is the oldest and by far the most common, engineering students acquire a basis of knowledge and capacities throughout a long course of higher study, including multidisciplinary scientific instruction, technological training and courses in economic, human and social sciences (management, communication, ethics, etc.). Project-based training, through case studies, experimentation and practical instruction, develops these students' sense of the concrete world and innovation.

The training includes on-the-job segments and experience abroad, possibly at the same time:

- Industrial internships or potentially industrial research
 - These segments help students understand the company environment and real-world working conditions and give them a chance to put their technical and scientific knowledge into practice.
 - Students who choose a research segment get their first experience in this type of work.
- Often a part of the curriculum is offered in international cooperation. This aims to promote engineering students' mobility, improving their chances of later finding work on the international job market and, along the same lines, promoting international engineering students' presence in France, primarily through preferential treatment for double degree curricula and joint degrees.

A double degree curriculum gives French or foreign engineering students the option of receiving degrees from two establishments where they have completed a significant portion of their curriculum (with respect for the appropriate legislation).

A joint degree is a single degree granted at the end of an original specific, comprehensive curriculum. With an equivalent amount of time spent in both establishments, it is primarily based on the existing curricula in place at partner higher education establishments. It features specific characteristics and is evaluated and accredited according to a joint procedure. More information is provided on this kind of programmes in section C. IV.

Apprenticeship for employee-status participants

The apprenticeship option combines academic instruction with on-the-job training in one or more professional activities that have a direct connection with the future qualification. These courses are taught according to an educational theory that moves from concrete experience to understanding the technical or theoretical methods and processes at hand. CTI insists that all apprenticeship programmes include an international segment abroad.

It is open to students enrolled in continuing education.

Job experience validation (« Validation des Acquis d'Expérience », VAE) and State-granted engineering degree (“Ingénieur Diplômé par l'État”, IDPE)

The “Diplome d'ingénieur” in France can be also obtained through two additional mechanisms: Job experience validation (« Validation des Acquis d'Expérience », VAE) and State-granted engineering degree (“Ingénieur Diplômé par l'État”, IDPE).

Job experience validation provides recognition for professional or extra-professional experience, in the form of a degree or a professional qualification certificate. These degrees and professional qualification certificates are therefore obtained through experience (not just through initial or continuing education), either fully or partially through Job Experience Validation. Job Experience Validation can be granted by all engineering graduate schools in France upon authorisation of CTI. The engineering degree obtained through Job Experience Validation has the same level of recognition as a degree obtained through initial or continuing education. The criteria for evaluating the acquired competences meet the same standards as the institutionally-accredited degree programmes.

As for the second mechanism, since 1934, the French State has been able to grant IDPE (Ingénieur Diplômé par l'État) degrees after validating candidates' career experience and skills demonstrated in jobs generally held by engineers. This system is similar to Job Experience Validation in purpose and in audience. The primary difference is that the IDPE degree is not granted by a school. It calls for at least five years' prior experience in a job generally done by engineers. CTI is in charge of running this system and limits it to around 100 degrees a year. It regularly updates the list of specialties and establishments authorised to review applications. The current chairman of the national jury is CTI's vice-president.

B.IV INTERNATIONAL RECOGNITION OF ENGINEERING DEGREES

Engineering graduates may work in France or abroad, for French or foreign companies; they need their competences to be recognised individually and collectively in foreign countries. It is therefore important for the engineering degree to be appreciated and recognised for its full value abroad.

European Network of Information Centres / National Academic Recognition Information Centres (ENIC - NARIC) has played a major role in providing individual information on how French and foreign degrees are recognised, in particular for graduates looking for information on their own degrees¹⁰.

The NARIC (National Academic Recognition Information Centres) network was founded in 1984 by the European Commission. ENIC (European Network of Information Centres) was founded in 1997 by UNESCO and the Council of Europe according to the same principles.

ENIC-NARIC France (<http://www.ciep.fr/>) is the French centre for information on professional and academic degree recognition.

- It provides information on academic and professional recognition,

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www.enic-naric.net

- It provides academic recognition certificates for foreign degree-holders
- It provides information on the procedure for recognising French degrees abroad.

B.V PROFESSIONAL ENGINEERING CERTIFICATION IN FRANCE

In many countries, professional certification is set up by the profession itself, for example by an order of engineers. In France, there is not an order of engineers, and the engineering profession is open and is not legally protected. The French engineering degree (“Diplôme d’ingénieur”) serves both as an academic and professional certification that’s highly appreciated by the job market.

In 2002, the public and professional players set up¹¹ the CNCP (National Professional Certification Commission) which lists all professional certification programmes and enters them into the RNCP (National Register of Professional Certifications), a public tool.

This register lists all professional degrees and qualification certificates, in particular those established by professional branches. Those granted on behalf of the State and created after receiving the opinion of consultation bodies (in particular engineering degrees) are entered into this register.

This register, with entries on, for example, the competences expected for professional certification holders, provides information for individuals (as part of Job Experience Validation, for example) and companies. There are plans to translate it into English to foster expansion outside France.

B.VI DEGREES AND PROFESSIONAL CERTIFICATIONS GRANTED ABROAD AND HOW THEY ARE RECOGNISED IN FRANCE

State admission of foreign engineering degrees

The State may grant "State Admission" for engineering degrees granted in European or non-European countries, upon these governments' request.

State admission for a foreign degree gives the degree-holder the right to use the "engineering degree" title (“*Titre d’ingénieur diplômé*”) in France. These engineers can then benefit from full engineer status.

CTI is legally required to perform an evaluation and give its opinion on recognition of these foreign degrees.

Accreditation of foreign degrees or degree programmes

More broadly, even outside the process of “State admission”, CTI is frequently asked to provide accreditation for foreign degrees and programmes in the field of engineering, especially now that the higher education evaluation and accreditation has been opened across Europe and worldwide.

CTI is one of the few agencies that’s specialised in the evaluation of engineering programmes. It is one of the 7 agencies entitled to deliver the EUR-ACE label, whose main characteristics will be examined in the following section.

The European System for Accreditation of Engineering Education (EUR-ACE)

This project was developed by the “European Network for Accreditation of Engineering Education” (ENAE), CTI is part of the ENAE network together with other 16 academic and professional organisations concerned with engineering education throughout Europe. This network stems out of ESOEPE, the “European Standing Observatory for the Engineering Profession and Education”, which was established on 9 September 2000 with the purpose of "build[ing] confidence in systems of accreditation of engineering degree programmes within Europe", and facilitating "exchange of information", "voluntary agreements on accreditation of engineering educational programmes and recognition of engineering qualifications" and "the development of standards on the competence requirements of graduate engineers".

¹¹ Cf. *Social modernisation law 2002-73 dated 17 January 2002 and Decree no. 2002-616 dated 26 April 2006 on the RNCP*

To pursue these aims, ESOEPE took the initiative of proposing to the European Commission (DG Education and Culture) the EUR-ACE® (“EUROpean Accredited Engineer”) project, approved in August 2004. Between September 2004 and March 2006 EUR-ACE® has elaborated a proposal for an European system of accreditation of engineering programmes at the First and Second Cycle level (including programmes leading directly to a SC degree): in the envisaged system, “national” engineering accreditations agencies should continue to award their certificates, and the common EUR-ACE® quality label be added to them.

Helping grant recognition for foreign professional certifications and degrees

Ultimately, as stated above, the process of recognising engineering degrees abroad leads the recognition bodies to seek out mutual recognition agreements that, due to the nature of engineering degrees and CTI's authority, touch on the academic as well as the professional aspect of these degrees and certifications.

CTI therefore works on international agreements, primarily mutual recognition agreements, in its own name and at its own level, in cooperation with the CNISF (Conseil National des Ingénieurs et Scientifiques de France-National Engineering and Scientists Council) for professional aspects.

For more information on the different agreements reached by CTI see the web pages of CTI (<http://www.cti-commission.fr/>) and the CNISF (<http://www.cnisf.org/>).

C. GENERAL PRINCIPLES AND CRITERIA FOR THE INSTITUTIONAL ACCREDITATION OF ENGINEERING DEGREE PROGRAMMES

C.I THE CONTEXT FOR ENGINEERING SCHOOLS' INSTITUTIONAL ACCREDITATION

The context for engineering schools' accreditation and, as a consequence, their institutional accreditation must account for the needs of stakeholders (socio-economic sector, society as a whole, engineering students), while leaving schools largely free to decide what type of engineers they want to train. CTI checks the coherence between society's needs, and the profiles of the engineers trained by the school ; it also checks the tools, processes and resources of the institution in order to achieve these goals. This work is part of the quality process, which is designed in a clear, consistent manner. CTI checks that the school has implemented this process.

The capacities and competencies required of engineering graduates

The expectations of professionals and society, expressed in terms of skills, have changed over time. With a specific focus on scientific and technical aspects, they have been gradually expanded, in particular in recent decades, upon the request of companies and engineers (cf. 2008 CNISF survey) to become an integrated, diverse, complex set of expectations.

The professions that fall under the scientific, technical and industrial engineering fields call for a set of interactive qualities, which can sometimes conflict.¹²

- **Knowledge and understanding of a broad range of basic sciences** and the related capacity to summarise and perform analysis,
- **Aptitude to use the scientific and technical resources related to a specialty,**
- **Understanding of engineering methods and tools:** identification and resolution of problems, even those that are not familiar and not fully defined, possibly using experimentation, innovation and research, the collection and interpretation of data, the use of computing tools, the analysis and design of systems,
- **Capacity to join an organisation, to lead it and drive it forward:** self-awareness, team spirit, commitment and leadership, project management, project coordination, communication with specialists and non-specialists alike,
- **Aptitude to take on board professional issues:** corporate spirit, competitiveness and productivity, innovation, intellectual and industrial property, respect for quality procedures, security, health and safety in the workplace,
- **Aptitude to work in an international context:** command of one or more foreign languages, cultural open-mindedness, international experience, business intelligence,
- **Aptitude to put sustainable development principles into practice:** environment, economy, labour and corporate governance,
- **Aptitude to consider and foster societal values:** endorsing social values, responsibility, ethics, health and safety,
- **Capacity to follow through on their professional choices** and fit into a professional context.

¹² *These units of knowledge, capacity or competence are formulated and detailed along with the adaptations needed to meet the schools' training objectives given in the RNCP (National Register of Professional Certifications) booklet established for the concerned training programmes. They are presented, developed and completed in each degree holder's individual engineering degree supplement.*

Objectives for engineering degree programmes

Based on this presentation, the interdependent themes studied during engineering training, over 5 years post-bac can be summarised as follows:

- **The acquisition and command of basic scientific and technical knowledge:**
 - Knowledge and understanding of a broad range of basic science fields (mathematics, physics, chemistry, mechanics, computer science, etc.),
 - Aptitude to use knowledge within a specialty,
 - Understanding of engineering methods and tools,
- **Adaptation to national and international professional fields** according to 3 themes:
 - Corporate spirit
 - Innovation and research
 - International relations
- **Human and societal aspects** (personal, social and environmental)

These themes will be developed according to the school's own objectives.

Engineers will complete their education through their own experience gained in the workplace (i.e. through stages in enterprise) and through appropriate training programmes to build their skills and responsibilities.

Engineering programmes fall under a currently difficult climate characterised by:

- an increased corporate demand for engineers, offset by recent economic fluctuations and the new context of globalisation,
- a drop, at least a partial one, in the number of applications and, as a consequence, in their quality (scientific level, social diversity, motivation for the engineer field or for the chosen disciplines),
- the major developments and diversification in science and technology over the past couple of decades and these fields' cross-development.

General principles for the institutional accreditation of engineering degree programmes

The general principles for setting up engineering degree programmes should make it possible to harmoniously develop the skills desired in engineering students. These principles are broken down by field and reflect engineering schools' background, business and societal demand (cf. part A) and recent changes in French, European and international higher education. These conditions concern the following, according to a traditional approach:

Formerly

- Degree-holders' employability,
- Selection of engineering students,
- School diversity and organisational structure.

Then

- Schools' openness (concept of a comprehensive school including its partners: companies and research laboratories, in France, abroad and at regional and local level).

And more recently

- A skills-based approach to programmes,
- The schools' quality process.

These principles are aligned with the ESG ¹³, and CTI's evaluation criteria are built around them.

¹³ *Standards and Guidelines for Quality Assurance in the European Higher Education Area - 2nd edition (2007)*

C.II INSTITUTIONAL ACCREDITATION CRITERIA FOR ENGINEERING TRAINING ESTABLISHMENTS

Criteria for institutional accreditation obviously focus on the degree programme itself, but they also involve directly or indirectly related points. For this reason, the criteria include governance and organisational issues, which are often at the root of the problems observed in lacking degree programmes.

Together with "References and Guidelines" CTI has produced two other documents: the "Complements to the References and Guidelines Booklet" ("*Cahier Complémentaire*") and the "Engineering Degree Self -Evaluation Guide" ("*Guide d'autoévaluation*"). The English version of the "*Cahier Complémentaire*" has not been released. As for the Guide, a condensed English version is available at the CTI's English web site. The full French version of these documents is accessible at: <http://www.cti-commission.fr/>.

These documents are supplemented by the "Self-Evaluation Guide," which gives information and a clear presentation of the principles and criteria and the evaluation reports.

All engineering graduate schools wishing to deliver a "Diplôme d'ingénieur" must meet the requirements described in the following paragraphs.

Engineering graduate schools from abroad who wish to go for the "State admission" process (see section B.VI) need also to globally comply with these criteria. Notwithstanding, in this case, a certain flexibility could be applied in order to adapt to national specificities (specific legal and regulatory frameworks, etc.). At the end of these section, we offer a compilation of mandatory criteria (this is to say, the minimum criteria that need to be respected in all situations, even by institutions outside the French legal framework).

Work and organisation (Degree Programmes/Schools/Establishments)

The school's objectives, organisation and resources are in line with its work

- The school has a clearly defined, identifiable moral and physical identity.
- The school must have a clear mission and engineering training objectives that are consistent with its environment and it must carry out this mission and these objectives.
- The school must be organised independently and have autonomous teaching methods and have all the human and material resources needed for its work.
- The school must have a solid governance board and a management team led by a director with clear, extensive authority. It is responsible before the administration.
- The School's Organisation ensures that the establishment project and the training programme are set up according to the proper material and moral conditions. It uses effective, transparent decision-making processes.
- The school's financial department is set up so that it can control its resources.
- The school ensures its appeal to students and defines an image policy that fits its educational project and its regional, national and international position.
- External communication is consistent with internal communication, and it helps improve the school's image.
- The school publicly issues objective, up-to-date qualitative and quantitative information about the school and/or the establishment and about its degrees and degree programmes.

Cooperation and Partnerships

The school is fully integrated into its local, national, European and international environment. It forms partnerships with similar establishments and with its stakeholders, especially companies and local authorities. It is fully aware that cooperation with the outside world is key to the quality of its work. It forms educational relationships with different local players who provide it with support.

- The school is open to feedback from its professional environment and adjusts its development to the projected changes in the profession. Active professionals are involved in the school's departments and in the engineering and implementation of teaching.
- Through relations with internal or external research organisations, the establishment and engineer training project on innovation, experimentation and research is defined.
- The school's international position and cooperation ensures that staff and students can be mobile. The school's European and international recognition should permit their students to acquire a multicultural education, which is essential in today's globalised economy, where executives are recruited from a global pool. Due to its future and existing European and international partnerships, the school is required to provide high-quality instruction and to provide acceptable conditions for international students. As a consequence, the school's strong international side includes language instruction, international mobility for students, the enrolment of international students, and more.
- The school is concerned with its recognition at national level, and it forms cooperation or other relationships to this effect.
- The school forms lasting, mutually beneficial relations with companies, local authorities and local education and research players.

Training plan

The training plan meets an identified need that comes from a socio-professional sector or, more broadly, from society. Engineer's desired profile, capacity and skills are defined and approved.

The new national and European orientations for engineering degree programmes ask for a skills-based approach to organising these degree programmes. This approach is consistent with directing students towards a sector and with companies' professional approach to recruiting, mobility and staff career management.

Within each school, it is currently subject to awareness-building with the different players active in the given training programmes.

By understanding the training plan, the players can work together to define or fine-tune programmes, teaching methods, or end-of-curriculum skills evaluations. They help the school communicate with its stakeholders, primarily applicants, engineering students and the professional world.

- The school and its surroundings discuss what is needed to bring graduate engineers' profiles up to date according to their needs.
- The desired engineer profile is defined according to the professional skills and capacities.
- In addition to evaluating the capacities, the school has an approach to evaluating engineering students' skills, in cooperation with companies.

Recruiting

The school recruits students for their engineering degree programmes in accordance with its mission and the characteristics of its training project.

- The school drafts its principles and strategies for recruiting students as part of its work.
- Recruiting is organised according to employment and training objectives.
- The school carefully organises recruiting and provides clear, public information on the matter.
- Recruiting criteria are adjusted according to employment and training objectives.
- The school checks the scope and quality of applicants' prior training, in particular in the basic sciences necessary for the degree.
- The school ensures that applicants' prior training and capacities are sufficient to meeting the degree programme's objectives, to obtaining the degree, and to working as an engineer in the future. The school ensures that its applicants come from diverse backgrounds.
- It recruits students from diverse geographic and social backgrounds.

The Commission insists that the engineering degree programme should be specific and comprised of a consistent five-year curriculum. Any parallel admission conditions must make reference to the skills acquired in previous curricula, not simply mention credit points. For example, licence (bachelor's degree) holders may be admitted in the last two years, but this should remain limited to exceptional applicants who have done extra training through internships and preparatory coursework. In most cases, these applicants are required to start in the first year of the engineering cycle.

Training engineering students

To achieve the capacities and some of the skills described in the training plan, the student acquires a base of knowledge and experience throughout a 5-year course of higher education study, including multi-disciplinary academic study, technological training and experience in the workplace. Instruction is also given through experimentation, to develop students' sense of the concrete and of reality.

- The training objectives are given as part of a skills reference system as the general (necessary to all engineers) or specific (related to a specialty area or field) knowledge, capacities and skills compared with the professional reference system definitions.

The objectives are closely inter-related and synergetic. In addition, parts I, II and III listed below are given simultaneously rather than successively. Under the criteria, they are most often given as actions.

- I. Scientific and technical dimension
- II. Economic and industrial dimension
- III. Personal and cultural dimension

- The degree programme's content and the related processes must work towards the training objectives.
- The school implements its degree programme in line with the European guidelines.
- Its teaching methods are in line with its objectives.
- On-the-job experience is considered to be fundamental to engineers' training and it is developed to this effect. No engineers may be granted degrees if they have not done at least one internship in a company.
- It describes internships in terms of the skills expected for the position.
- Students are strongly advised to get experience abroad, either through an internship or an academic exchange.
- If the degree programme is heavily research-oriented, students may do a long internship with a research laboratory rather than a corporation. In this case, the minimum internship period may be 14 weeks.
- The school considers that student life is fundamental to an education, and it works to foster this aspect of training.
- It checks its students' results and monitors their progress.
- Once the engineering degree is granted, students are eligible to work as qualified engineers. The school assumes responsibility for any consequences and takes the necessary provisions for its work.

Jobs for engineering graduates

The school is concerned with its graduates' job prospects

- The school has taken the provisions necessary to understanding the recent situation and evaluating prospects for employment in its sectors of study, as well as its graduates' first jobs.
- The school provides its students with career information and counselling
- The school fosters its future graduates' career orientation and their preparation for the workplace.
- The school ensures that its graduates' first jobs meet its engineering training and recruiting objectives.

Quality process and continuing improvement

CTI checks that the school has a valid quality process, in particular:

- The school has quality standards for its work and its continuing improvement.
- It applies the European recommendations for its quality process.
- The school questions its own management and its results and examines their quality and how to improve them.
- Teaching is evaluated regularly and systematically in order to devise means of improvement.
- The school has defined its main stakeholders, primarily: companies (large corporations, SMEs and start-ups) and the professional world, society and the State, staff, and students. It is attentive to the needs of other stakeholders: local establishments, foreign establishments, local authorities.
- Its open relationship towards its stakeholders guarantees maximum participation in the school's own quality management procedures.
- The school meets the requirements of CTI's external quality assurance procedures.
- The school meets other evaluation organisations' external evaluation requirements.
- Teaching is evaluated regularly and systematically in order to devise means of improvement.

C.III CONDITIONS FOR IMPLEMENTATION ACCORDING TO DEGREE TRACKS

In general, a degree should correspond to a set of skills related to the desired engineering profile. How the person acquires these skills and status as an engineering student (student, apprenticeship participant, continuing education participant, job experience validation applicant) are secondary to the student's skills.

Traditional training (student status)

The basic principles are given below:

- Each degree should have a professional skills reference system, and the training agenda must be consistent with this reference system.
- The engineering degree is granted after ten semesters of post-bac study, or a consistent curriculum of 300 ECTS credits approved by the school.
- The first four semesters may be done in *grandes écoles* preparatory classes or in preparatory courses, either at the school or outside the school. The six following semesters are taken as a continuous course.
- Students may be recruited through examination either in the first semester after the baccalaureate, or in the fifth semester after preparatory classes. The number of spots available is clearly stated ahead of time. There may be additional selective recruiting during the fifth semester, for exceptional candidates with continuous BTS, IUT or university training. Finally, some students may be recruited in the third and seventh semesters, although this should remain marginal.
- After recruiting, the entire engineering curriculum is under the school's authority. The student must spend at least three semesters at the school during the last three years of training (last two years if recruited during the seventh semester). The portion of training done outside the school (internships, academic exchange, etc.) must be under the school's supervision, possibly as part of a joint programme.

The training programme must include:

- 1800-2000 hours of lecture training during the last three years,
- a significant amount of training given by instructors from the corporate world,
- a significant amount of academic training in disciplines not directly related to the specialty (languages, management, economics, communication, business, ethics, intellectual property, etc.).
- an academic project,
- at least 28 weeks of internships, preferably in companies,
- an innovation aspect and research initiation,
- a certified level of English according to a recognised external test. The preferable level of English is level C1 in the Council of Europe's European Framework of Reference for Languages. Under no circumstances will an engineering degree be granted to students who do not reach certified level B2. This obligation for results does not exempt schools from having a language education strategy based on the skills expected of future engineers on the job. In particular, a second foreign language is strongly recommended.
- a strong international bent (language education, international mobility for students, enrolment of foreign students, the school's international outlook).

Each part of the degree programme done outside the school, whether in France or abroad, is done under an agreement between establishments according to the terms described in the school's rules. Internships must also be covered under these rules and are subject to internship or employment contracts in accordance with current regulations.

Gap years¹⁴ should remain exceptional. The gap year should not be part of the standard educational curriculum.. Since gap years should be the exception rather than the rule, establishments should not promote them during recruiting.

Apprenticeship programmes

All cases, this training method requires a partnership with the company or professional organisation. Most often, the partnership structure is identified after the training needs are formulated.

CTI considers that, for this type of formation, academic training should be redesigned to account for this specificity and that this type of programmes should include special curricula, not just the repetition of students' work duties.

The general training objectives for capacities and skills are the same as for individuals with student status¹⁵

The course schedule should be adapted to suit the training process. Inasmuch as possible, it should use the company's and the school's assets and skills to work together to train engineers. In some cases, this could lead to highly personalised courses.

For apprenticeship programmes to be successful, they must be well-prepared.

- Each degree should have a professional skills reference system, and the training agenda must be consistent with this reference system.
- The apprenticeship programme training cycle lasts three years (semesters five to ten). As with student-status training programmes, additional students may be admitted in the seventh semester.
- The preferable minimum level of English is level C1 in the Council of Europe's European Framework of Reference for Languages. Under no circumstances will an engineering degree be granted to an apprenticeship participant who does not reach level B2 certified by an external recognised test.
- The total number of in-school training hours should be around 1800 hours.
- On-the-job training periods should give students identified skills that are approved for their degree.

Continuing education

To be eligible for this type of training, candidates must have a technical degree and have at least three years of professional experience. This training programme is given with traditional teaching methods, as an alternated course or through distance learning for example.

- Each degree should have a professional skills reference system, and the training agenda must be consistent with this reference system.
- The training cycle encourages consideration of acquired professional skills and individual learning processes.
- The target level of English is level C1 in the Council of Europe's European Framework of Reference for Languages. Under no circumstances will an engineering degree be granted to an intern who does not reach level B1 certified by an outside organisation.

Job Experience Validation

The engineering degree obtained through Job Experience Validation is equivalent to a degree obtained through initial or continuing education. The procedure breaks down the specific conditions for obtaining the engineering degree requested by the applicant.

The criteria for evaluating acquired skills must meet the same standards as the institutionally-accredited programmes:

¹⁴

¹⁵

See section B IV

- The skills required for the degree are described in a skills reference system and must be detailed in a document written by the school.
- The target level of English is level C1 in the Council of Europe's European Framework of Reference for Languages. Under no circumstances will an engineering degree be granted to an applicant who does not reach level B1 certified by an outside organisation.
- Any international requirements are necessary under the same conditions as for initial training.
- The applicant must prove in a thesis and before a jury that his or her skills meet the degree reference system.

The make-up of the job experience validation jury is determined by the school, in agreement with any partners. It must include members of the jury who decide upon the engineering degree in question and professionals (other than part-time associate professors).

To provide information to potential applicants, the school must define a reference system for each institutionally-accredited degree (skills, knowledge, aptitude, etc.), specifying the requirements, criteria and types of proof required for the written application and the oral exam; the RNCP sheet may be used as the first level for this reference system.

International cooperation

CTI encourages engineering graduate schools to have bold policies on international relations, in order to promote engineering students' mobility, improving their chances of finding work on the international job market and promoting international engineering students' presence in France, through preferential treatment for dual degree curricula and joint degrees.

Partnerships must be formed with establishments that grant equivalent degrees recognised by the competent authorities in their own countries and in the same field.

In all cases, the partnership is governed by a specific agreement that specifies the expected results and may involve joint degrees or dual degree curricula. We will now examine some particular cases:

Joint degree

A joint degree is a single degree granted at the end of an original specific, comprehensive curriculum. It is primarily based on curricula in place at partner establishments and must have the following characteristics:

- the study period is equal to a normal course of study,
- the degree programme is still taken by engineering students in partner countries (in a comparable number), at least for the last two years,
- the curriculum is balanced for partner establishments' programmes,
- in partner countries, the degree has institutional accreditation from the competent authorities, if possible through joint proceedings.

The degree may concern more than two establishments from different countries. In French schools, this is a new degree that requires institutional accreditation.

Double degree

A dual degree curriculum gives French or foreign engineering students the option of receiving degrees from two establishments where they have completed a significant portion of their curriculum (with respect for the appropriate legislation). In any case, the dual-degree curriculum requires reciprocity, meaning that French students may attend the European or foreign establishment and European or international students may attend the French establishment.

The dual degree curriculum is based on an appropriate curriculum including periods of study in both establishments, which may be different for engineering students from both countries, and with a target balance of flow and time in both establishments.

- The French establishment's degree can only be granted to engineering students (French or foreign) who have spent four semesters under the French establishment's authority, including at least three semesters actually in the establishment; the fourth semester may include an internship in France or abroad under the school's or a partner establishment's authority.
- The establishments sign an agreement to set the conditions for mobility and the terms for granting the degree.

CTI does not grant special accreditation for dual-degree curricula: during its periodic visits, it checks that the previous rules are respected.

Specialised training (6 years post-bac)

Programmes for 6-year post-bac degrees, which are open to engineering graduates, must study an underdeveloped specialty in depth and meet a clearly-identified corporate need. This assumes that the school has broad skills that are recognised under the specialty field. Enrolment levels for these training programmes must be in line with the demand for graduates with these specialties.

- Only degree-holding engineers, as the law defines the term, may be given specialty engineering degrees. Graduates with non-engineering degrees are granted a certificate from the establishment

The final year of engineering training may be done in a specialised school. In this case, the degree is granted by the home school, and the specialised school grants a specialised study certificate.

Mandatory criteria for engineering programmes offered by institutions abroad

As stated above, even if all the institutions wishing to deliver the « Diplôme d'ingénieur » must demonstrate a global compliance with the CTI referential, a certain flexibility is allowed for institutions abroad to adapt to specific national legal and regulatory frameworks.

Nevertheless, a number of criteria have been identified as “mandatory”; that is to say, they need to be respected by the totality of the accredited institutions.

The higher education institutions, in a global and complex context have to innovate, while complying with these essential components of engineering education:

- A strong and broad basis in fundamental sciences in order to guarantee analytical competences and the capacity for adjusting in the long term the demanding evolutions of the engineering and management activities.
- The engineering sciences provide a guarantee of efficiency and short term adaptation to a professional activity (experience and innovation).
- Business culture and economic, social, human, environmental ethics awareness (partnerships of the higher education institutions with the profession, involvement of professionals in training, internships in industry, entrepreneurship,..).
- Communication skills and international awareness (international partnerships, intercultural experiences, language skills, joint diploma, ..).

Fulfillment of these criteria is a condition for good employability in engineering activities. The education is based on a coherent master level curriculum of 300 ECTS awarded in higher education.

C.IV SPECIFIC CRITERIA FOR ENGINEERING DEGREES IN INTERNATIONAL COOPERATION (ESPECIALLY, JOINT DEGREES AND DOUBLE DEGREE CURRICULA)

Context

CTI encourages engineering graduate schools to develop active and responsible international relations strategic, in order to promote academic mobility in and out of the institution. The institution should be capable to adequately organize and control international courses and industry stages, so that they are well integrated in the curriculum and appropriately assessed. The main objective is to be in a position to guarantee that these international cursus permit to achieve the intended profile of competences and, hence, the “Diplome d’ingénieur” of the school can be delivered.

CTI is concerned by the academic programme followed by:

- Engineering students from a French institution that will follow part of their training programme at an international institution.
- Students from an international institution that will follow part of their training programme at a french institution and pretend to obtain a French « Diplôme d’ingénieur »

CTI should ensure the quality of both international and french institutions participating in the delivery of a French “Diplome d’ingénieur”. The recognition of the international institution and/ or programme by a recognized accreditation agency other than CTI is indeed a favorable assessment element. In most cases, engineering programmes that include a training period abroad will lead to an extension of the total duration of the studies. This likely extension is not one of the compulsory requirements of CTI.

Engineering schools should be able to ensure and document that international mobility of the students takes places in a context of formalized agreements between the French and the international institutions. These agreements should explicit all relevant elements are guaranteed, specifically, the recruitment and monitoring of the students and the minimum requirements in terms of physical presence at the French institution (see later).

CTI encourages collaboration initiatives leading to a new and truly innovative joint cursus, benefiting from synergies between the two partnering institutions. Engineering schools should define their international collaboration strategy and criteria beforehand and be selective as to the partnerships they choose.

Joint cursus and double degree curricula

General conditions

The joint cursus and double degree curricula established between a French engineering school and another international institution should respect the following conditions:

Partnerships should be established between institutions delivering **academic programmes in the same thematic field and at the same academic level (master). The international programme should be officially recognized in its country of origin by the competent authorities.**

A certain balance should be attained, as to the number of students exchanged between the two institutions and the time spent in every one of them.

These joint academic projects should respect the guidelines and requirements of the European Higher Education Space, such as the utilization of competences, the use of ECTS and the Diploma Supplement. These cursus should also respect the general references and guidelines established by CTI.

All partnership agreements should be adequately formalized through a written agreement including all relevant elements (recruitment and monitoring of the students and the minimum requirements in terms of physical presence at the French institution).

CTI will be particularly vigilant regarding to aspects such as the specific periods of time spent in academic institutions and in industry, the quality of the education programme and the quality of academic institutions.

Double degree curricula

An international double degree programme enables an engineering student to simultaneously obtain the two official degrees issued by two partnering institution.

Double degree agreements established by French institutions must respect the following conditions:

- The double degree programme must include study periods in the two institutions.
- These periods could be different depending on the institution of origin of the student.
- The double degree programme is subject to a written agreement that specifies the objectives of the cursus, the different itineraries followed by the students in the two institutions, the contents and organization of the cursus (semesters, ECTS, the diploma supplement), the conditions for simultaneously obtaining the two degrees, etc.
- As to the extension of the cursus, CTI establishes that the minimum period of presence of the engineering student in the French institution delivering the “Diplome d’ingénieur” **is 3 semesters of courses during the three last years of the programme plus 1 semester (minimum) of stages in industry**. This period of stages could be programmed in France, in the partnering country or in a third country. Anyway, this period must be controlled by the French institution.
- In order to obtain the “Diplome d’ingénieur » the French part of the cursus must comply with the general quality criteria established by CTI, particularly with regards to the duration of the studies and the stages in industry.
- These cursus are different from validations of international study periods made on a singular basis. In most cases, double degree agreements will result in an extension of the total duration of the studies of one to two semesters.

The school should make sure that all the possible itineraries followed by the students permit to achieve the intended profile of competences and, hence, the “Diplome d’ingénieur” of the school can be delivered.

Joint degree programmes

In accordance with the Lisbon convention on the recognition of joint degrees, a joint degree could result in the following academic certifications:

- a. A joint diploma delivered in addition to one or two national diplomas.
- b. A joint diploma delivered without any other national diploma.
- c. One or two national diplomas.

CTI recommends formule B. In this case we are talking of a completely new programme that’s established jointly by the two partnering institutions. This new programme must be:

- of the same duration than a standard “Diplome d’ingénieur”
- officially recognized by all competent authorities in all the participating countries.
- followed jointly by the students of the two partnering institutions, at least from bac+2 (two years after secondary studies) in the case of 5 years’ schools and bac+3 in the case of schools in 3 years.
- adequately balanced between the two institutions (3 years if possible in the French school), including industry stages.
- subject to a written agreement that specifies the objectives of the cursus, the contents and organization of the cursus (semesters, ECTS, the diploma supplement), the conditions for simultaneously obtaining the two degrees, etc.
- the degree must be delivered by an only jury, jointly established by the two institutions.
- a diploma supplement must be delivered.

- In order to obtain the “Diplome d’ingénieur » the French part of the cursus must comply with the general quality criteria established by CTI, particularly with regards to the duration of the studies and the stages in industry.

Nota

Other situations could be found that do not imply any change in the cursus and that cannot be considered as a joint degree programme or a double degree programme, particularly:

- An Erasmus-type mobility that will not lead to any specific diploma other than the ordinary academic certification.
- When a formal double diploma agreement has not been established between two institutions, a specific student could anyway obtain the official diplomas of the two institutions, provided he meets certain conditions and follows a particular curricular track.

C.V APPLICATION OF THE PRINCIPLES AND CRITERIA AND THE CONSEQUENCES FOR EVALUATION, ACCREDITATION AND INSTITUTIONAL ACCREDITATION

Application of these principles and criteria

A decision is made based on these criteria provided in the establishments' statements made through their self-evaluation and institutional accreditation files (primarily quantitative data) and on the documents examined and the qualitative information gathered during the audit process, including the on-site visit. The audit team must look at tangible, observable facts and at the guarantees of improvement or progress included in the institutions' strategic or operational guidance documents.

CTI has to make a decision on the institutional accreditation period granted to educational establishments, generally engineering graduate schools, and the requirements or recommendations they need to respect. The maximum accreditation period granted in France is **6 years**. Frequency of accreditation abroad may vary according to specific national constraints.

CTI makes a comprehensive judgement on the training programmes and their impact on their environment. Despite the engineering graduate schools' diversity, CTI does not aim at ranking or benchmarking them.

Although criteria are useful and necessary, CTI feels that they must be able to be applied in a flexible way that accounts for future developments. From its observations, it has defined strengths and weaknesses. These criteria can be applied in different situations thanks to CTI's reference documents, member training, their terms of office, their experience participating in all CTI's evaluation and accreditation activities, and the number of members, all of which maintain stability. Compliance with the references and the consistency of decisions remain a source of CTI's main ongoing requirements.

Wisdom, sometimes a firm hand, and dynamic vision have always guided CTI's work. Institutional accreditation is given for a set period, no longer than six years. Except in unusual circumstances, institutional accreditation periods do not extend beyond the concerned region's timetable.

The review of past evaluations and institutional accreditations highlights any difficulties and improvements. The annual evaluation of the satisfaction of schools visited by CTI measures the quality of CTI's service¹⁶. Although it is not perfect, it is generally appreciated. Like all quality accreditation boards, CTI is committed to making progress.

¹⁶

Cf. annual survey on schools visited

D. PROCEDURES FOR DELIVERING INSTITUTIONAL ACCREDITATION AND RECOGNITION TO ENGINEERING DEGREE PROGRAMMES

All establishments that provide training for the purpose of granting an engineering degree must have the proper institutional accreditation.

CTI provides the necessary prior accreditation as well as different types of recognition for engineering programmes abroad.

This section describes the procedures, in application of the regulatory texts and in accordance with the "Standards and Guidelines for Quality Assurance in the European Higher Education Area" (ESG Part 2)¹⁷.

D.I THE INSTITUTIONAL ACCREDITATION PROCESS IN FRANCE

The process includes 4 stages:

- a preparatory stage,
- an audit stage,
- an accreditation and opinion stage,
- an accreditation process results communication stage.

The preparatory stage

The annual school meeting

CTI has divided the French territory into 6 different regions. Each one of these regions is periodically assessed on a 6 year basis. The regional campaigns for the third national evaluation campaign are:

- 2009-2010: Northern and Eastern France (Amiens, Besançon, Dijon, Lille, Nancy- Metz, Reims, Strasbourg academic divisions)
- 2010-2011: South-West (Bordeaux, Limoges, Poitiers, Toulouse academic divisions)
- 2011-2012: Paris (Paris academic division)
- 2012-2013: areas neighbouring Paris (Versailles and Créteil academic divisions)
- 2013-2014: North-Western France (Caen, Nantes, Orléans-Tours, Rennes, Rouen academic divisions)
- 2014-2015: South-East (Aix-Marseille, Clermont-Ferrand, Grenoble, Lyon, Montpellier, Nice, Réunion academic divisions)

Each year, in February of the year before a region's institutional accreditation deadline, CTI holds a regional evaluation campaign launch meeting to which all the school directors are invited. This gives CTI the chance to present school management with the updated reference systems and procedures, and to hear the schools' opinions and learn about the issues facing them. Engineering graduate schools from abroad who wish to undergo the CTI's accreditation process are also invited to this event. All the information on the different CTI's annual school meetings can be found on CTI's webpage (<http://www.cti-commission.fr>) .

¹⁷

http://www.enqa.eu/files/ESG_v03.pdf

The renewal file examination schedule for the year is set: CTI mission heads are appointed according to the regional renewal schedule and the audit missions and plenary meetings are scheduled.

Other requests outside the schedule

To give schools the chance to respect their own recruiting schedules and to give CTI the time to study the institutional accreditation request files, the timetable for granting institutional accreditation to degree programmes that start in September of Year X, is as follows:

- Before July of Year X-1, the school submits the file, if possible after sending a letter of intent for new files, so that CTI can appoint a mission head,
- September to December of Year X-1: study of the file, visit if necessary, preparation of the report.
- October of Year X-1 to February of Year X: CTI's deliberations. There may be as many as four months between the visit and the plenary meeting.
- Any request filed after the summer of Year X-1 will be ineligible for institutional accreditation of a degree programme that starts in September of Year X. Under no circumstances may an organisation begin promoting an engineering degree programme if it has only submitted its request.

This mandate may be covered in an annual joint statement with AERES to examine possible cooperations both on the schedule itself and on file content or visit organisation, which are established by both organisations.

Members of the CTI mission

For evaluations corresponding to a standard renewal of CTI's accreditation, the CTI mission's main spokesperson is appointed in the plenary meeting before the annual meeting of school directors, and this information is given to the school during this meeting.

The other members of the audit team are defined in the plenary meeting in the months leading up to the audit, upon the suggestion of CTI's appointment committee. These audit team members are members or experts of CTI, and they are selected according to their skills in the school's field. If possible, they are selected from different colleges. Now, in accordance with international standards, there is a student expert on the audit team. For ethical reasons, they cannot have any direct or indirect connections with the establishment.

Foreign observers may be appointed as part of international agreements on mutual recognition of accreditation or European labels. Finally, following European recommendations, representatives from student organisations may join the mission.

The size of the mission team depends on the number of degree programmes to be examined. It is generally made up of two to three people, and up to six for large establishments.

The school's institutional accreditation request file

The school's institutional accreditation request is the responsibility of the school director or the person in charge of the school creation plan. It must be a group effort and give the group the chance to think about the school and its degree programmes. It must be part of the school's quality process and one of its strong points.

In preparing the file, it may refer to the "Engineering Degree Programme Self-Evaluation Guide". CTI's website posts its main essential documents and gives the exact composition needed for each type of file as well as the appendices. A condensed version of this guide is available in English. The full version of this document is available at the web page in French.

The main file should be no longer than 40 pages.

Brochures, leaflets and other documents may be attached to this file.

All these documents may be given to the CTI's evaluation team on a CD. Institutional accreditation request files must also be submitted to the CTI's registry:

*Grefe de la CTI
Direction de l'Enseignement Supérieur et de l'Insertion Professionnelle
Bureau. DGES B 3 2 , aile arras
1 rue Descartes , 75231 PARIS 05*

Preparation for the site visit

The main spokesperson and school director contact each other to set a date and define the exact visit schedule for one or more sites.

The school must provide the mission with all the necessary documents during its visit. All the information necessary to performing the evaluation, in particular the justifications of organisation and results must be ready for submission. Using the Self-Evaluation Guide, the establishment's management team checks that it has gathered together these items and filed them so that they are accessible (consulting report, language test results, internship reports, project reports, etc.).

The audit stage

The audit team examines the file, visits the site and then writes the mission report.

The file is examined before the evaluation mission

CTI's Registry sends the main spokesperson a recap of previous missions, its points of discussion and the corresponding institutional accreditations.

The audit team uses any opinions issued by AERES or other evaluation structures on the establishment (establishment, research, training, etc.) when they are accessible.

The audit team examines the file and may ask for information if necessary.

Site visit

The CTI evaluation mission's on-site expertise must include a meeting with all the school's main players and partners and ultimately lead to an objective ruling on every aspect of overall evaluation of the concerned degree programme.

Since at least two hours should be spent studying each specialty, a one-day mission should not examine more than two specialties within a single establishment. A day and a half is often preferable. If the establishment grants degrees in more than two specialties, the mission must last at least two days.

The visit may be organised according to the table detailed in the booklet.

Preparation of the mission report

The spokespeople may ask for any information they feel is necessary to drafting their reports after the mission.

After the visit(s) conducted under the conditions described above, the main spokesperson, with help from other members of the mission, writes the mission report.

This person makes reference to the plan and content of the Engineering Degree Self-Evaluation Guide. It should reflect the following

for renewals:

- the school's overall change since the last follow-up mission and its plans for the coming years,
- follow-up and implementation of recommendations from CTI's previous visit,
- It must include an analysis of strengths and weaknesses,

for initial institutional accreditation:

- the general training context and how well it suits the job market,
- overall project economy, its opportunity, predicted enrolment and the selected structure,
- how well the teaching choices fit the overall project,
- the degree programme's level and the level of the scientific and technical environment,
- the student recruiting process,
- an evaluation of costs and the relevance of funding.

Consideration for the school's reactions

The mission report, which includes strengths and weaknesses but no conclusions or proposals, is sent to the school director (and the establishment director if necessary), who sends his or her comments to the audit team before the final report is drawn up.

If the director wishes, these comments may be sent in a written document attached to the report so that the school can examine them in a plenary session.

Sending the mission report to the CTI registry

The report, which may be modified according to the director's comments and includes an appendix with the school's written observations, if there are any, plus the mission's conclusions and proposals, is sent to the Commission Registry.

The supplements to the report focus on:

- the recommended institutional accreditation period,
- related recommendations,

to support the appreciation of the establishment's or school's strengths and weaknesses and of the training programme.

It must be clear that the conclusions and suggestions in the mission report are not binding over the opinions or decisions given and voted on in the plenary meeting.

The main spokesperson specifies which documents must be sent to the Commission members. Submission to the plenary session depends on the date the report is received by the registry.

Accreditation and opinion stage

This involves presentation of the school's file and the mission report, followed by a plenary debate and the accreditation decision, accompanied by recommendations.

Inclusion on the agenda by the office

At the beginning of the calendar year, the commission defines the plenary session period. The office establishes the commission's plenary session agenda.

The commission's plenary session

In the plenary session, the Commission makes a sovereign decision on accreditation and gives its opinion on institutional accreditation for schools and a decision for private schools. After the main spokesperson's presentation (the school director's hearing for private schools) and the discussion, the chairman holds a vote on the proposed institutional accreditation period and the recommendations.

The institutional accreditation period (ranging from one to six years) depends on any observed problems and the necessary recommendations. For files examined outside of the scheduled campaign, the institutional accreditation period may not exceed the time before the next scheduled examination of the school in question.

In addition to the recommendations, the plenary session may give recommendations to be covered in future reports, for example a half-period report.

The recommendations must be implemented immediately, in full.

If several major problems occur, the institutional accreditation period is limited to one year, which serves as a warning under Article L. 642-6 of the Education Code (private schools). This is the first step in institutional accreditation revocation proceedings, and a mission is planned for one year later.

The Commission may request any information it sees necessary before making its decision.

It may also suspend its opinion or its decision about immediate or future changes.

Issuing the result and subsequent phases

The results communication procedure

CTI's accreditation is sent to the concerned ministries and made public. It is equivalent to institutional accreditation for public schools and an institutional accreditation decision for private schools. It is posted on CTI's website.

Public schools are institutionally accredited by the concerned minister(s) upon reception of CTI's opinion. Private schools are institutionally accredited by the concerned minister(s) upon reception of CTI's decision. They inform the school when institutional accreditation is granted.

The list of schools given institutional accreditation by the competent ministers is published each year in the *Journal Officiel de la République Française* (France's Official Journal); it is available on the CTI website.

Appeals

Private schools are subject to different rules than public schools:

- for private schools, CTI's decisions may be eligible for appeals. They must be made before the CSE (*Conseil Supérieur de l'Éducation* - Higher Council of Education) (article L 231-6 of the French education code),
- for public schools, CTI issues its opinion. At this point, in accordance with public law, decisions on institutional accreditation made by the concerned minister(s) are eligible for appeal.

Following up recommendations

School directors ensure that CTI's opinions and recommendations are communicated. In particular, they send CTI's audit mission report to the president of the establishment and to the school's board.

If CTI attaches specific report requests to its recommendations before institutional accreditation expires, the establishment or school must spontaneously provide these intermediate reports. CTI's spokespeople and registry will not send out any reminders, and these reports will be considered missing when institutional accreditation is renewed.

D.II INSTITUTIONAL ACCREDITATION OF ENGINEERING INSTITUTIONS ABROAD

State admission proceedings include the following stages:

The foreign establishment contacts CTI to submit its accreditation project for all or some of its degree programmes, after it has read the document "References and Guidelines"

CTI checks that the request is receivable and whether or not there is an accreditation agency in the country:

- if the country's agency is a member of ECA, ENQA or ENAEE and it has signed an agreement for mutual recognition of accreditation decisions, CTI and the school's national agency agree to define a joint accreditation process: a shared reference system, request for a single self-evaluation report, a joint external evaluation panel, a single evaluation report and separate accreditation decisions,
- if the country does not have an accreditation agency, CTI visits it before the self-evaluation report is written and then begins the usual procedure used for French establishments.

CTI informs the establishment of its results: accreditation and recommendations.

In case the CTI's accreditation is granted, in the case the foreign institution wishes their diplomas to be admitted by the French State, then, through diplomatic channels, the establishment requests the French State's admission of the foreign degree so that the engineering degree can be granted to students who have successfully completed the accredited training programmes.

The degrees and degree programmes admitted by the State are included in: the annual public decree published in the Official Bulletin of the French department of education and the European list of degree programmes with ECA-member accreditation, QROSSROADS.

GLOSSARY

Accreditation

Guarantee given by a competent or recognised body that a future or existing programme of study, service or higher education establishment meets quality standards. These standards may be entirely or partially established by the profession that corresponds to the students' degree programme. Accreditation is decided according to compliance with the selected standards and may be given along with recommendations.

Apprenticeship programmes

Training organised as part of an individual work contract.

Quality assurance

Guarantee that a company or organisation is using the resources necessary to meeting its objectives.

Bachelor's degree

Degree comprised of 180 credits obtained over six semesters, including the licence in France.

Certification

Proceedings in which a third party gives a written guarantee that a product, process, service or person meets specific requirements

CNCP (Commission Nationale de Certification Professionnelle - National Professional Certification Commission)

This commission has the following duties:

- Listing the professional certification offer (national list of professional certifications),
- Making sure that degrees and certificates are appropriate for the professional environment, issuing recommendations to institutions that grant professional certification or qualification certificates.
- Noting any correspondence between certifications,
- Writing new names for certification levels.

Academic curriculum

Designates the training provided by a higher education establishment on top of any professional training in the workplace (apprenticeship courses).

Specialised school

School with the institutional accreditation to grant specialised engineering degrees, which are open to engineering graduates who would like to study a field in further depth or acquire an extra set of skills.

ECTS (European Credit Transfer System)

System adopted by countries that adhere to the La Sorbonne- Bologna process. An academic semester includes 30 credits.

ENQA (European Association for Quality Assurance in Higher Education)

ENQA distributes quality assurance information, feedback and best practices to higher education establishments' public evaluation and accreditation agencies. ENQA writes the ESGs.

EQAR (European Quality Assurance Register)

EQAR is a register of European evaluation and accreditation agencies that have demonstrated their credibility and their reliability after an audit that tests their compliance with the ESGs.

ESG (European Standards and Guidelines)

ESGs are the reference systems adopted by the European area ministers, for higher education institutions and the bodies that evaluate them and/or provide them with accreditation.

Teaching establishment

A legally-identified entity that organises one or more educational curricula. Engineering schools' statuses do not necessarily correspond to specific types of establishments (engineering schools may be Public Establishments (Scientific, Cultural and Professional Public Establishments - EPCSCPs - or Administrative Public Establishments - EPAs), external administrative services, university departments, private establishments, foundations, consular establishments, French limited liability companies, etc.)

Evaluation

An examination procedure established to determine how much an existing process, service or institution meets the appropriate level of quality or specific requirements. It is one of the basic elements of quality assurance. Reference systems may come from different sources (government texts, internal rules, continuing improvement, etc.).

Institutional accreditation

Act by which an authority grants legal capacity to an individual or an organisation. Such as a school granting an engineering degree.

Approval

The approval of technological degrees and titles was a State recognition that consisted in ranking requesting public or private organisations' degrees by level and by specialty, after examination by a commission. Since 2002, it has been replaced by inclusion in the RNCP.

Apprenticeship course mentor

Cf. corporate tutor.

Quality management

All the organisational and methodological resources an organisation uses to guarantee the quality of its objectives, practices and results (cf. Total Quality Management System).

Integrated master's degree

Degree obtained by totalling 300 credits as part of a consistent master's-level curriculum (cf. engineering degree).

Educational levels (1969 criteria)

- I –Engineering degree, Professional and Research Master's, Doctorate,
- II - *Licence* (Bachelor's), [Master's], IUP,
- III - DUT, BTS, 2-year post-bac degree,
- IV - Baccalaureate, Professional Baccalaureate,
- V - BEP, CAP (Professional Certificates).

Optional study

For engineering degree programmes, an in-depth course of study of optional specialised coursework and a final project (other terms including specialty, major, etc. should be avoided). The optional course of study is not mentioned on the diploma.

Final project

An in-depth work comparable to an engineering project, completed over a 3- to 6-month period. The final project is generally done in connection with a company and may be highly technical or more scientific in nature. In the latter case, it may be done in a school laboratory.

Students doing a final project must present a report before a jury made up of all of the concerned partners. The evaluation of this work is very important to the student's degree results.

State Recognition

State recognition certifies that a private establishment is useful to the public service of higher education. It checks the establishment's operation, its training, and its supervisory and teaching staff.

RNCP (National Register of Professional Certifications)

The RNCP provides up-to-date information about the professional degrees and titles and qualification certificates included on the French professional job commissions' established lists. This information is available to individuals and companies.

Specialty

As part of an engineering degree programme, an extremely in-depth study lasting at least four semesters, with a Final Project focusing on a certain professional technical field or discipline. The specialty is subject to specific institutional accreditation and is included in the name of the degree.

Engineering student status

Definition of the legal and social framework that governs engineering students: student, apprenticeship participant, active employee or employee on leave, continuing education participant, civil servant, job seeker, etc.

Diploma supplement

Individual document attached to the diploma, to make the degree programme easier to understand and recognisable abroad. It describes the type, level, context and content of the student's studies.

Academic tutor

A permanent instructor in charge of supervising an intern's or an apprenticeship student's training during the portions of study in the workplace: this person makes sure the projects or assignments given are suitable to the student's coursework. S/he advises and supports the engineering student on methodological matters.

Corporate tutor or apprenticeship programme mentor

An executive responsible for the intern or apprenticeship participant, on administrative and professional matters. This person shares skills with the student, suggests projects and assignments and supervises them, and helps evaluate the student.

Double tutoring

All curricula with an alternate course requirement include double tutoring, under which the student has an academic tutor and a corporate tutor (or an apprenticeship mentor if applicable)

Job Experience Validation

A degree programme based on skills acquired on the job. Job experience validation is performed by all engineering schools in France upon CTI's revision of the procedure.