

GRADUATE PROGRAM INGENIEUR CIVIL DES MINES

GRADUATE PROGRAM "Ingénieur Civil des Mines"

OBJECTIVES

The educational program at the school aims at training engineers to be capable of innovating and leading change in all aspects of business and society, capable of working in a team in a complex international and multicultural environment, driven by an entrepreneurial spirit.

Another goal is to train engineers to be responsible and humanistic, able to adapt to the extreme changes that they will encounter throughout their careers.

To do this, the program gives a strong foundation in scientific knowledge, rounded out with courses in humanities, economics and management in academic programs shared with schools specialized in other disciplines and courses in foreign languages and culture.

The objective of the options program is to establish a means for acquiring knowledge and skills in an engineer's area of specialization, thus giving him the capacity to become an expert in this field. It allows for putting basic scientific knowledge into practice and thus helping to develop the methodological spirit and adaptability of a civil engineer from the Mines of Nancy.

DIVERSIFIED TEACHING METHODS

> Using differentiated teaching methods means that the diversity of the talents and objectives of the students are recognized and it allows each one to create their own personalized curriculum.

Recognizing that students' talents are diverse and many is also recognizing that their objectives, especially professional, can be quite diverse: it is giving them the possibility to choose their courses and to understand the reason for their choices and thus the reason for each course's content. It is for this reason that the school gives details about the objectives for each of the courses in the program.

Offering a very extensive program allows the student to make several substantiated choices, in particular in second and third year, and thus to create their own personalized curriculum.

> Learning by action to learn to act: taking risk and exercising responsibility.

Learning to act can only be learned by practicing action itself.

To this end, the student is put in active situations on numerous occasions, in particular with project activities and internships: being involved with extra-curricular activities is also, in this respect, an excellent way to learn, and is encouraged by the school for this reason.

> Learning to deal with what is complex

The scope of an engineer's activities deals with what is real, thus with what is complex. Several times during their academic career at the Mines, students be confronted with a complex situation that they will have to learn deal with, in particular with the ARTEM labs (see the chapter devoted to this subject), which combines carrying out a real project with multidisciplinary learning, as much by the complexity of the project as by the composition of the groups of students involved.

> Learning about living in society

An engineer is not just responsible for making sure that a company adheres to laws, that is to say, the rules and regulations that define the organization and functioning of the company; he is also very often the author/producer of rules and new organization (quality management, sustainable development, etc.).

To prepare engineering students to exercise these responsibilities, the Ecole des Mines puts the student, within the school itself, in a pre-professional exercise of rights and duties. For example, presence in class is compulsory, the same as the presence of an engineer in the workplace is required on a daily basis.

Another example: students are invited to give their opinion and to make propositions for any changes to the rules on how the school operates. They are periodically asked to evaluate the quality of the teaching and to participate in discussions on pedagogical developments. The school is itself a place to learn to exercise responsible power.

TEACHING METHODS BUILT AROUND TWO INTERACTIVE AND COMPLEMENTARY TIME PERIODS

It is, above all, about developing the best minds, capable of creativity and an entrepreneurial spirit.

The program of Ingénieur Civil des Mines de Nancy is built around two complementary time periods :

- **A time for learning in the classroom:** this is the time period for the personalized curriculum of a student engineer's program, which will not go beyond 25 hours of classroom time per week on average;
- **A time for self-learning,** as a complement to the classroom time, but also for becoming effectively involved in one or more associative activities.

The school encourages students being involved in an associative activity because, in light of the purpose of the program, it can help develop autonomy, taking responsibility and risk as well as creativity and cultural awareness.

Some examples of associative activities would be:

- Junior Enterprise: Mines Services:
- The Est-Horizon enterprise Forum: an annual organization that brings together about a hundred companies and hosts more than 5,000 students each year:
- The Student Union (le Bureau des élèves) and the 40± clubs it organizes:
- Inter-university or inter-school activities: University of Lorraine orchestra, associations created with ARTEM-Nancy.

The students of the school create and manage these activities in complete autonomy.

AN ENGINEER'S SKILLS AND CAPABILITIES

The capabilities and skills needed for an engineering graduate have been set out by the Commission des Titres d'Ingénieur (CTI) N.B. Besides these general skills, they have defined specific requirements that the Ecole des Mines of Nancy must adhere to. There is a general chart that indicates what pedagogical elements correspond to these specific competencies listed below.

• Knowledge and understanding of a wide field of basic sciences

The program of Ingénieur Civil des Mines de Nancy aims at developing the skills needed to manage complex systems, man-made or natural, by using modeling, optimization by simulation and visualizing data or simulation results to the best in order to understand, analyze, predict and efficiently communicate with various interlocutors.

• Ability to mobilize resources from a scientific and technological field related to a specialization

The program of Ingénieur Civil des Mines de Nancy aims at developing the capacity to implement specialized knowledge acquired from scientific research for technological, economic or financial applications in different industrial sectors or services.

• Mastering engineering methods and tools

The program of Ingénieur Civil des Mines de Nancy aims at developing the methodological skills needed for optimally managing industrial systems, service activities or organizations, and the skills in economics and management necessary for operating national or international businesses and organizations.

• Ability to fit into an organization, to run it and to make it grow, and the ability to make professional choices

The program of Ingénieur Civil des Mines de Nancy aims at developing strong skills, acquired from experience, in collaborating with the professional world of industry, services and local governments, with the support of the Director of Action towards Businesses and Communities.

• Ability to take into account professional issues and the ability to implement the principles of sustainable development

The program of Ingénieur Civil des Mines de Nancy aims at developing skills in innovation and piloting innovative projects in different sectors of economic activity, in accordance with the principles of sustainable development and social responsibility, and with the support of the Chair in Engineering Innovation.

• Ability to work in an international context

The program of Ingénieur Civil des Mines de Nancy aims at developing the capacity, through experience, to be open to collaborators having complementary skills such as those in design or business, and to collaborators from diverse foreign cultures, with the support of the Department of Languages and Culture and Multimedia, the Director of International Relations, the ARTEM-Nancy Associations and ARTEM-Enterprises.

• Ability to take into account societal values and to ensure they are respected

The program of Ingénieur Civil des Mines de Nancy aims at developing the capacity to think and debate about humanities (arts, literature and social sciences), to discover and take into consideration diverse cultures and foreign societies, the global economic and financial environment, as well as the environmental issues.

N.B. – The CTI (Commission des Titres d'Ingénieur) is an independent body fully involved in the development of the European Higher Education Area, established by the French law in 1934. Its missions are respectively: the evaluation and accreditation of higher education institutions in the fields of engineering, computer science, applied mathematics, project management, etc.: the development of quality in engineering education: the promotion of engineering curricula and careers in France and abroad. (i.e. Germany, Switzerland, Bulgaria, Viet-Nam, others in process...)

CTI competencies	1A	2A	3A	Stage de fin d'études
Fundamental Sciences	Scientific Core Curriculum	Option	Option	
Modeling, optimization, visualization		Electives	Electives	
A speciality in a field of activity		Option	Option	
		Electives	Electives	
Engineering methods	Scientific Core Curriculum,	Operation Research		Stage de fin d'études
Industrial Engineering	Business Management Core Curriculum	Business Management Core Curriculum	Managerial Sectors	
Economics and management	Business games	and Managerial Sectors	Electives	

<i>Professional issues</i>	Innovation activities	Internship and gap year internship	
<i>Sustainable development</i>	Work experience, tutorials	Option project	Option project
<i>Innovation and responsibility</i>	Company visits, Professional and alumni meetings	Artem project	
	Sport, Associations	Departmental Week	
<i>Enjeux professionnels</i>	Semaine	Option project	Option project
<i>Développement durable</i>	recherche-innovation	Artem project	Business games
<i>Innovation et responsabilité</i>	Projet 1A	Sustainable Development events	
<i>International Context</i>		Languages and foreign cultures	
<i>Intercultural Collaboration</i>	Languages and foreign cultures	Intégration étudiants étrangers	
		Integration of foreign students	Languages and foreign cultures
		Departmental week abroad	
		Artem labs	
		Internship and gap year internship	
<i>Societal values</i>	Humanities	Humanities	Managerial Sectors
<i>Humanities</i>	Work experience	Business Management Core Curriculum	Foreign cultures
<i>Cultural Diversity</i>	Project	Managerial Sectors	Electives
<i>Global issues</i>	Sport	Foreign cultures	
		Electives	

TEACHING METHOD

A normal teaching unit includes one hour of “class” and two hours of tutorial.

Students, as part of their independent work, will learn the basics of their coursework from a text booklet that will be provided by the teacher (photocopies, etc.). The “class” is thus mainly an interactive question/answer session between the professor and the students.

The tutorial takes place in small groups so as to promote learning to work in a team and interactive creativity.

The practical work involves, for the most part, projects and internships, which make up 40% of the global time for the curriculum of the student’s program. At the Ecole des Mines, the teacher is, under these teaching conditions, positioned as a mediator between the student and the knowledge to be learned: disciplinary as well as pedagogical. In fact, it is important that students acquire knowledge and that they understand how to do it.

EVALUATING THE TEACHING METHOD

For more than forty years, the Ecole des Mines de Nancy has had the students evaluate the quality of its teaching methods.

At the Ecole des Mines of Nancy, students use a twofold system for evaluating the teaching methods.

- At the end of each teaching unit, the education received is evaluated individually through an evaluation grid provided by the teacher. This evaluation essentially serves the teacher so that he can adjust his teaching methods, if needed. Part of this evaluation grid is standardized and transmitted to the department heads for an analysis of the possible improvements before being returned to the Director of Studies.
- At the end of each semester, the engineering students collectively and globally evaluate the education received before the Director of Studies.