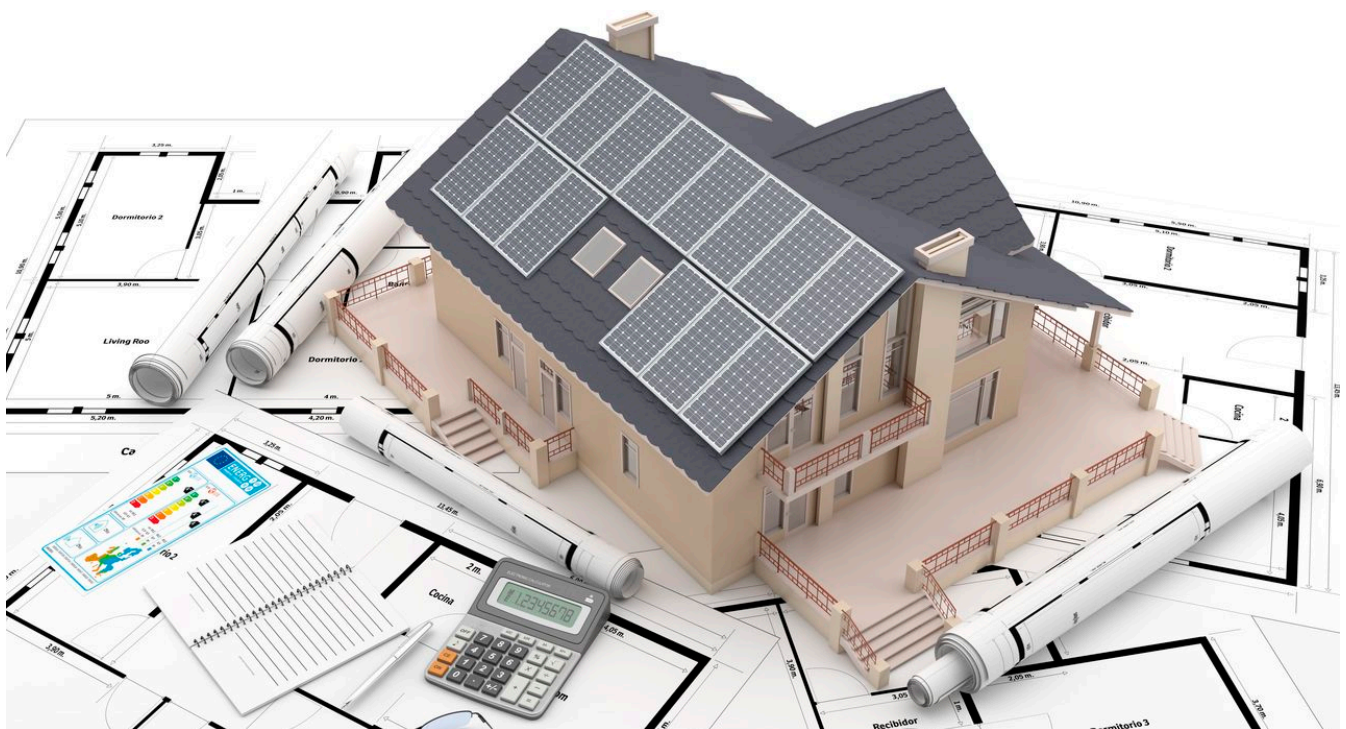


Curriculum of the program in Environmental, Civil and Energy Engineering



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Glossary

Program

EBE Ecoconstruction, Civil engineering, Energy engineering

Special tracks

EN Energy engineering
GE Environmental science
IB Civil engineering

Course codes

CHIM Chemistry
EASI Electrical engineering and signal processing
ENER Energy
GECH Civil engineering
GEDP Process engineering
INFO Computer science
LANG Foreign languages
MATE Materials
MATH Mathematics
MECA Mechanical engineering
PHYS Physics
PROJ Projects and internships
SHES Humanities and social sciences

General terms

CC Continuous examination
ET Final examination
TC Common course
TD Exercises
TP Labs
UE Program unit

Semester 5

UE	ECTS	Module	Course name	Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
UE501 : Engineering Sciences and Tools	12	DDRS502	Sustainable Development	11.5	9		1.5	CC(50%) + CT(50%)
		EASI501a	Electrical Engineering	13.5	15	12	3	CC(70%) TP(30%)
		INFO501a	Number representation and algorithm design	12	10.5	16	3	CT(70%) + TP(30%)
		INFO502a	Data base	6	4.5	12	1.5	CT(70%) TP(30%)
		MATH500a	Mathematics refresher course		21			CC
		MATH501a	Mathematics	21	19.5		3	CC
UE502 : Engineering Sciences	12	ENER511a	Heat Transfer	22.5	18		3	CC
		GECH511a	Building Functions and Technologies	13.5	15	12	3	CC
		MECA511a	Fluid Mechanics	12	28.5		3	CC
		MECA512	Mechanics	16.5	24		3	CI(30%) CT(70%)
UE503 : Professional Environment	6	LANG500a	Tutoring in English		12			
		LANG501a	English		40.5		3	CC
		SHES501a	Sport		21		1.5	CC
		SHES504a	Communication	1.5	6	12	1.5	Oral

1. UE501 : Engineering Sciences and Tools

1.1. DDRS502 - Sustainable Development

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
11.5	9		1.5	CC(50%) + CT(50%)

Language(s) for the course

- French

Course description

This course aims to familiarize students with the issue of sustainable development and its integration in company policy and enable them to take control of this aspect in their professional and private life. In particular the aspects related to energy and climate change will be addressed.

1.2. EASI501a - Electrical Engineering

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
13.5	15	12	3	CC(70%) TP(30%)

Language(s) for the course

- French

Course description

Basics of electrical engineering, transient operations, direct and alternative currents.

1.3. INFO501a - Number representation and algorithm design

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
12	10.5	16	3	CT(70%) + TP(30%)

Language(s) for the course

- French

Course description

This course aims on the one hand to acquire the basic knowledge on the representation of information in computers and on the other hand to acquire the basics of algorithmics and programming with an introduction to the use of an object language.

1.4. INFO502a - Data base

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
6	4.5	12	1.5	CT(70%) TP(30%)

Language(s) for the course

- French

Course description

This course introduces some of the key features of relational databases. The practical classes will be applied to both general and professional issues :

- UML Entity Relationship Diagram (ERD)
- Relational Model (RM) and algebra
- SQL

1.5. MATH500a - Mathematics refresher course

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
	21			CC

Course description

This course aims to reinforce the bases in mathematics .

1.6. MATH501a - Mathematics

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
21	19.5		3	CC

Course description

This course aims to give the basic concepts in analysis useful for engineering sciences

2. UE502 : Engineering Sciences

2.1. ENER511a - Heat Transfer

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
22.5	18		3	CC

Language(s) for the course

- French

Course description

Acquisition of the physical principles relating to the three modes of heat transfer: conduction, radiation and convection. The knowledge of these modes of heat transfer must make it possible to model and analyze different systems or processes in order to study their thermal behavior and to improve their efficiency.

2.2. GECH511a - Building Functions and Technologies

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
13.5	15	12	3	CC

Language(s) for the course

- French

Course description

After introducing the 'actors' approach, the 'functions' approach, the 'performentielle' approach and the phasing of construction operations, this course focuses on building technology: technical choices to consider, justification of the chosen solutions, phasing choices. In a second part, the course is dedicated to the main principles of electricity in buildings.

Three applications of this course address in draft form the themes of building: 1/definition and scope of a function approach, 2/Analysis and evaluation of building performance, 3/Justification of technical choices

2.3. MECA511a - Fluid Mechanics

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
12	28.5		3	CC

Language(s) for the course

- French

Course description

This course aims to give the fundamentals in incompressible fluid mechanics. The basic tools for hydraulics design are presented, then the balance equations for fluid mechanics are studied, with a short overview of free surface flows. The last part is devoted to dimensional analysis.

2.4. MECA512 - Mechanics

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
16.5	24		3	CI(30%) CT(70%)

Language(s) for the course

- French
- French with documents in english
- English

Course description

The course "Applied mechanics" leads (i) to acquire basic knowledge of continuum mechanics, (ii) to analyze the state of solicitations (stress, strain, plasticity criterion) of simple structures and (iii) to solve simple problems of continuum mechanics.

It is composed of:

- statics of non-deformable solids: 2D application,
- the states of stress and strain,
- the elastic and isotropic behavior law,
- the general equations of continuous media and the methods of resolution,
- criteria of plasticity and sizing

3. UE503 : Professional Environment

3.1. LANG500a - Tutoring in English

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
	12			

Language(s) for the course

- English

Course description

3.2. LANG501a - English

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
	40.5		3	CC

Language(s) for the course

- English

Course description

This course aims at training our engineering students to obtain a minimum score of 785/990 in the TOEIC test (« Test of English for International Communication ») as required by the CTI (the accredited French National Institution supervising the award of engineering degrees. Our students are also trained to improve in all four language skills (listening, reading, writing and speaking) on a variety of (everyday life and professional) topics via the news, videos, oral presentations, mock interviews, debates, writing assignments, etc...

The students are evaluated through continuous assessment.

3.3. SHES501a - Sport

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
	21		1.5	CC

Language(s) for the course

- French

Course description

This course is based on the practice of physical and sports activities and has two axes.

On the one hand, it allows the students to acquire know-how for the sports activities and to put forward their social skills, qualities required for their insertion and their professional success. This axis is based on the values conveyed by the various sports activities and their diversified modes of practice.

On the other hand, it allows the students to acquire collective skills in the realization of a project and the management of a group and also to develop their individual capacities of adaptation and regulation. This axis examines the collective organization and the implementation of a sports event on a session.

3.4. SHES504a - Communication

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
1.5	6	12	1.5	Oral

Language(s) for the course

- French

Course description

This course enables students:

- to project themselves into their future career,
- to measure the importance of communication in their engineering mission and to acquire bases (both oral and written).

Semester 6

UE	ECTS	Module	Course name	Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
UE601 : Engineering Sciences	8	ENER613	Energy and Fluids	7.5	9	32	4	CC
		MATE611	Building Materials	12	9		2	CC
		MATH612	Data and Deci- sion-making Aid	9	16.5		2	CC
UE602 : Engineer- ing and con- struction or- ganization	7	GECH612	Building Mod- eling - Introduc- tion to CAD- software an BIM	1.5		28	2	CC
		GECH613	Structural Mechanics	15	13.5	12	3	CC
		PROJ611	Project-based learning: Build- ing Professionals			24	2	CC
UE603 : En- ergy and En- vironmental Quality of Buildings	9	GECH611	HVAC	13.5	30		4	CC
		GECH615	Acoustics, and Lighting	18	30	12	5	CC (75%) + TP (25%)
UE604 : Profession- nal Envi- ronment	6	LANG600	Tutoring in English		12			
		LANG601	English		40.5		3	CC
		PROJ601	Internship Dis- covery of the Professional Environment					Quitus diplôme
		SHES601	Introduction to Accounting and Corporate Finance	10.5	9		1.5	CC
		SHES602	Introduc- tion to Law	15	4.5		1.5	CT

1. UE601 : Engineering Sciences

1.1. ENER613 - Energy and Fluids

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
7.5	9	32	4	CC

Language(s) for the course

- French

Course description

Thermodynamics (CM: 7.5h; TD: 9h): This teaching aims to acquire:

- the basic notions of thermodynamics: study of systems involving work, heat and energy exchanges in general, based on concrete applications encountered in engineering.
- understand the operation of ditherm systems, for the conversion of thermal energy into work (or vice versa).

Practical work (TP: 32h): Thermal Transfers, Fluid Mechanics and Thermodynamics

1.2. MATE611 - Building Materials

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
12	9		2	CC

Language(s) for the course

- French

Course description

This course aims to:

- Define the main classes of materials and their specific properties (structural, thermal, ...)
- Understand how to evaluate data quality and how to use data rigorously
- Understand thermal conductivity, hygrothermal properties, durability and flammability of materials
- take into account the environmental impact of materials

1.3. MATH612 - Data and Decision-making Aid

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
9	16.5		2	CC

Language(s) for the course

- French

Course description

This course is presented in two independent parts:

- The first part aims to enable the acquisition and control of basic concepts in probability and in statistics.
- The second part gives working tools necessary in building and mastering a decision making aid problem with multiple criteria.

2. UE602 : Engineering and construction organization**2.1. GECH612 - Building Modeling - Introduction to CAD-software an BIM**

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
1.5		28	2	CC

Language(s) for the course

- French

Course description

After an introduction to the principle of Building Information Modelling (BIM), students will learn the basics of several CAD software environments:

- AutoCAD for 2D drawing
- Allplan and/or Revit for 3D building design
- Revit MEP for HVAC system and network design

2.2. GECH613 - Structural Mechanics

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
15	13.5	12	3	CC

Language(s) for the course

- French
- French with documents in english

Course description

This "Mechanics of Structures" course aims to:

- analyze (i) stresses, (ii) diagrams of normal load, shear load and bending moment on isostatic structures
- design isostatic structures
- calculate the deformation of structures subjected to simple loading (as tensile, compression, bending loads)

2.3. PROJ611 - Project-based learning: Building Professionals

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
		24	2	CC

Language(s) for the course

- French

Course description

The objectif of this project is to understand the roles and missions of various actors of a construction project throughout its life cycle. The students, divided into groups (12 students) representing the project manager (4 students), the mastery of work (4 students) and the achievement (4 students) should identify which this information engage companies and when these informations must be produced.

3. UE603 : Energy and Environmental Quality of Buildings**3.1. GECH611 - HVAC**

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
13.5	30		4	CC

Language(s) for the course

- French

Course description

The course presents fundamentals and different technologies of heating systems for buildings as well as domestic hot water systems. Design and sizing of 'all water' heaters and duct networks is discussed in detail. Basics of control are also given.

3.2. GECH615 - Acoustics, and Lighting

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
18	30	12	5	CC (75%) + TP (25%)

Language(s) for the course

- French

Course description

The course will give the student experience in two themes:

- Architectural acoustics (or building acoustics) : the science and engineering which analyzes noise transmission from the building's exterior envelope to interior and vice versa ; building codes with requirements of acoustic analysis in order to protect building occupants from exterior noise sources and sound generated within the building itself ;
- Light and lighting : the main terms within photometry and lighting techniques, basic photometric laws, the eye's reaction to light and the most important visual factors for workplace lighting, daylight as a source of light, daylight data and calculations in accordance with building regulations, the significance of daylight for health and well-being, overview of electric sources of light and their qualities.

4. UE604 : Professional Environment

4.1. LANG600 - Tutoring in English

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
	12			

Language(s) for the course

- English

Course description

4.2. LANG601 - English

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
	40.5		3	CC

Language(s) for the course

- English

Course description

This course aims at training our engineering students to obtain a minimum score of 785/990 in the TOEIC test (« Test of English for International Communication ») as required by the CTI (the accredited French National Institution supervising the award of engineering degrees. Our students are also trained to improve in all four language skills (listening, reading, writing and speaking) on a variety of (everyday life and professional) topics via the news, videos, oral presentations, mock interviews, debates, writing assignments, etc...

The students are evaluated through continuous assessment.

4.3. PROJ601 - Internship Discovery of the Professional Environment

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
				Quitus diplôme

Course description

Discovery of the professional environment

4.4. SHES601 - Introduction to Accounting and Corporate Finance

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
10.5	9		1.5	CC

Language(s) for the course

- French

Course description

The objective of this course is to acquire the basics of financial management.

4.5. SHES602 - Introduction to Law

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
15	4.5		1.5	CT

Language(s) for the course

- French

Course description

The objective of this course is to obtain a basic understanding of law

Semester 7

UE	ECTS	Module	Course name	Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
UE701 : Engineering and Construction Technologies	10	GECH711	Reinforced Concrete	18	18		2.5	CC
		GECH712	Structural Me- chanics: design and modelling	15	42	20	5.5	CC
		GECH713	Geotechnics	7.5	9	12	2	CC(70%) + TP(30%)
UE702 : Building's energy per- formance	10	GECH714	Thermal per- formance of the Building	18	22.5		3	CC
		GECH715	HVAC	9	18	32	4	CC
		GECH716	Thermal and Environmen- tal Regulations	10.5	7.5	20	3	CC
UE703 : BIM	4	PROJ711	Project-based learning: BIM			36		CC
UE704 : Professional Envi- ronment	6	LANG700a	Tutoring in English		6			
		LANG701a	English		40.5		3	CC
		LANG702a	Foreign lan- guages (above Toeic level)		30		3	CC
		SHES703a	Profession- al resources and dynamics		10.5	8	1.5	Oral (50%) + rap- port et soutenance stage 3A (50%)
		SHES704a	Creativity and innovation management	12	13.5		1.5	CC (20%) Rap- port +Soute- nance(80%)

1. UE701 : Engineering and Construction Technologies

1.1. GECH711 - Reinforced Concrete

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
18	18		2.5	CC

Language(s) for the course

- French

Course description

Design reinforced concrete structures following Eurocode 2

1.2. GECH712 - Structural Mechanics: design and modelling

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
15	42	20	5.5	CC

Language(s) for the course

- French

Course description

The main part of this course is devoted to the standards for building construction. The different types of loadings (dead loads, imposed loads, wind, snow...) and their calculation are introduced. In this part, the load transmission is addressed so that validation of the design can be studied in the frame of the limit states. Structural instabilities such like buckling or dumping and the shear phenomenon are also presented.

Practical courses with conception software may consolidated the knowledges also.

1.3. GECH713 - Geotechnics

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
7.5	9	12	2	CC(70%) + TP(30%)

Language(s) for the course

- French

Course description

This class aim to present different notions of soil physics, (namely characterisation, mechanics, hydraulic and thermal behaviour) by mean of theoretical, experimental and practical approaches. The class takes examples of building foundations, geothermy, pollution diffusion within groundwater.

2. UE702 : Building's energy performance**2.1. GECH714 - Thermal performance of the Building**

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
18	22.5		3	CC

Language(s) for the course

- English

Course description

Building Physics concerns the study of the hygro-thermal and aeraulic behavior of the rooms as well in steady state as in transient state. It makes it possible to understand the notion of hygrothermal comfort and it is at the base of the HVAC systems (calculation of the thermal loads) and calculations related to the French thermal regulation.

2.2. GECH715 - HVAC

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
9	18	32	4	CC

Language(s) for the course

- French

Course description

Moist air principles, Mollier Diagram and their applications for heating, ventilating and air conditioning of buildings are studied in this course. In addition students perform some applications on laboratory equipment.

2.3. GECH716 - Thermal and Environmental Regulations

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
10.5	7.5	20	3	CC

Language(s) for the course

- French

Course description

The RT2012 thermal standards constitutes an essential element of the Grenelle de l'Environnement. In this course, this regulatory context is precisely described : the objective of limiting the primary energy consumption of buildings includes the implementation of performance requirements (building energy efficiency, building energy consumption, summer comfort in non-air-conditioned buildings). The implementation of the current French thermal standard (RT2012), and tools for dynamic thermal simulation of buildings are widely developed.

The fight against climate change is declined in two major orientations regarding new buildings : nationwide roll-out of positive energy buildings, and widespread construction of buildings which are low-carbon emitting throughout the duration of their life cycles, from design through to demolition.

This course also gives the basic principles of this future environmental regulation of buildings, now known as "Experimentation E + C-", as well as the main concepts of environmental quality of buildings.

3. UE703 : BIM**3.1. PROJ711 - Project-based learning: BIM**

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
		36		CC

Course description

This course is an application of the Building Information Modelling (BIM) workflow. Each session is a problem-based situation that shows the advantages and the operation of new digital building design tools.

4. UE704 : Professional Environment**4.1. LANG700a - Tutoring in English**

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
	6			

Course description**4.2. LANG701a - English**

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
	40.5		3	CC

Language(s) for the course

- English

Course description

This course aims at training our engineering students to obtain a minimum score of 785/990 in the TOEIC test (« Test of English for International Communication ») as required by the CTI (the accredited French National Institution supervising the award of engineering degrees).

Our students are also trained to improve in all four language skills (listening, reading, writing and speaking) on a variety of (everyday life and professional) topics via the news, videos, oral presentations, mock interviews, debates, writing assignments, etc...

The students are evaluated through continuous assessment.

4.3. LANG702a - Foreign languages (above Toeic level)

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
	30		3	CC

Course description

A 15-hour course in English: Culture, civilisation and language.

And a 15-hour course in a second foreign language in:

- Spanish, German et Italian at Chambéry and Annecy (no beginners).

- Chinese et Japanese at Annecy (beginners accepted)

4.4. SHES703a - Professional resources and dynamics

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
	10.5	8	1.5	Oral (50%) + rapport et soutenance stage 3A (50%)

Language(s) for the course

- French

Course description

The objective of the module is to lead the students towards a better self-knowledge in order for them to be able to define a professional project, develop a targeted research strategy and present themselves effectively in an interview.

4.5. SHES704a - Creativity and innovation management

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
12	13.5		1.5	CC (20%) Rapport +Soutenance(80%)

Language(s) for the course

- French

Course description

This module aims to introduce the students to corporate strategy, and thus enable them to be able to understand the current major corporate orientations. The emergence of new competitive practices based on externalization perspectives or cooperation through partnership training in order to share the risks and costs will be studied.

Semester 8

UE	ECTS	Module	Course name	Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
UE801 : Energy Sys- tems (op- tional unit)	7	ENER811	Thermodynamics	16.5	28.5		3.5	CC
		ENER812	Design flu- id networks	12	10.5	36	3.5	CC
UE801 : En- gineering and Con- struction Technolo- gies-2 (op- tional unit)	7	GECH811	Reinforced concrete	21	30	12	4.5	CC
		GECH812	Metal Con- struction	12	19.5		2.5	CC
UE802 : Renewable Energy and Environ- ment (op- tional unit)	7	ENER813	Renew- able Energy	22.5	31.5		4	CC
		ENER814	Environmental, economic and energy Issues	25.5	16.5		3	CC
UE802 : En- gineering and Con- struction Technolo- gies-3 (op- tional unit)	7	GECH813	Geotechnics	13.5	19.5	12	3	CC(70%) + TP(30%)
		GECH814	Construction-site supervision	24	36		4	CC
UE803 : Engineering and design	4	GECH815	Numeri- cal Method	3	13.5		1.5	CC
		PROJ811	Project-Based Learning: Engineering and Design			36	2.5	CC
UE804 : Profession- al Envi- ronment	12	LANG800	Tutoring in English		6			
		LANG801a	English		40.5		3	CC

UE	ECTS	Module	Course name	Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
		LANG802a	Foreign languages (above Toeic level)		30		3	CC
		PROJ801	Engineering Assistant Internship				6	Soutenance, rapport écrit, évaluation entreprise
		SHES802a	Integrated Management System QSE (Quality Safety Environment)	9	10.5		1.5	CC
		SHES803a	Organization theory	13.5	6		1.5	CC

1. UE801 : Energy Systems (optional unit)

1.1. ENER811 - Thermodynamics

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
16.5	28.5		3.5	CC

Language(s) for the course

- French

Course description

The aim is to be able to analyze and understand the operation of building energy systems, both at the level of their components and at the level of overall systems. The energy and entropy balances, and the thermodynamic modeling of humid air are treated before approaching the energy systems (heat pumps, air handling units, heat or cold production or storage units, ...). The other objective is to provide the students with the scientific and technical knowledge of combustion processes.

1.2. ENER812 - Design fluid networks

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
12	10.5	36	3.5	CC

Course description

This course aims to:

- to present the various technologies of heat exchangers and tools related to their dimensioning,
- to apply the knowledge acquired on the different technological units of production, distribution and emission to meet the coupled needs of heating, production of DHW, ventilation and production of refrigeration in a building. This second part will be approached in the format of Problem Learning.

2. UE801 : Engineering and Construction Technologies-2 (optional unit)

2.1. GECH811 - Reinforced concrete

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
21	30	12	4.5	CC

Language(s) for the course

- French

Course description

This course allows:

- To define the frame of a reinforced concrete building following its structural analysis

- To approach the calculation of the current elements (continuous beams, poles, floors, foundations) as well as some elements of reinforced concrete structure of large dimension.

- To study the fire behavior of reinforced concrete structures

2.2. GECH812 - Metal Construction

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
12	19.5		2.5	CC

Language(s) for the course

- French

Course description

This course is devoted to the design of steel building. The main part concerns the design of a single steel element (beam, pole...), submitted to solicitations (compression, tension, shear, bearing and elastic instabilities). The desing of assemblies is presented also. Finally, building conception and desing outline are introduced during a case study.

3. UE802 : Renewable Energy and Environment (optional unit)

3.1. ENER813 - Renewable Energy

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
22.5	31.5		4	CC

Language(s) for the course

- French

Course description

Scientific and technical basis for the development of professional wood energy projects, and ground source heat pump projects or air source heat pump projects.

3.2. ENER814 - Environmental, economic and energy Issues

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
25.5	16.5		3	CC

Language(s) for the course

- French

Course description

Economic and technical basis (cost-efficiency analysis, and investment analysis) are given for the development of energy efficiency projects, and renewable energy projects.

Presentation of the challenges of the energy transition and the French context : issues, actors, energy taxation, and levers of action.

4. UE802 : Engineering and Construction Technologies-3 (optional unit)

4.1. GECH813 - Geotechnics

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
13.5	19.5	12	3	CC(70%) + TP(30%)

Language(s) for the course

- French

Course description

"Geotechnics 2" deals with the mechanical behaviour of soils submitted to large deformation. The class focuses on technical and normative geotechnical issues, and aim to study the design of foundation and sustaining walls.

Theoretical notions as stress tensor, effective stress will be recalled, and the concept of failure criterion will be introduced.

4.2. GECH814 - Construction-site supervision

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
24	36		4	CC

Language(s) for the course

- French

Course description

Basics for building site management : scheduling and planning of building projects ; building economics ; safety, risk prevention and management ; improving environmental impact

5. UE803 : Engineering and design

5.1. GECH815 - Numerical Method

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
3	13.5		1.5	CC

Language(s) for the course

- French

Course description

Through various illustrations derived from engineering configuration, the Finite Difference approach is introduced, in order to compute a numerical approximation as a solution of the modelling.

5.2. PROJ811 - Project-Based Learning: Engineering and Design

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
		36	2.5	CC

Language(s) for the course

- French

Course description

This project aims to understand the imbrication of the different disciplines in a building project (problem of inertia, therefore thermal / structure, problem noise / structure, problematic renovation loading / insulation, ..) or monoteknical and thus oriented towards thermal expertise on very specific projects (positive energy building, structural dimensioning a wooden construction, energy rehabilitation of a building, structural restructuring of a building with or without extension, ...).

6. UE804 : Professional Environment

6.1. LANG800 - Tutoring in English

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
	6			

Language(s) for the course

- English

Course description

6.2. LANG801a - English

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
	40.5		3	CC

Language(s) for the course

- French

Course description

This course aims at training our engineering students to obtain a minimum score of 785/990 in the TOEIC test (« Test of English for International Communication ») as required by the CTI (the accredited French National Institution supervising the award of engineering degrees).

Our students are also trained to improve in all four language skills (listening, reading, writing and speaking) on a variety of (everyday life and professional) topics via the news, videos, oral presentations, mock interviews, debates, writing assignments, etc...

The students are evaluated through continuous assessment.

6.3. LANG802a - Foreign languages (above ToEIC level)

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
	30		3	CC

Course description

A 15-hour course in English: Culture, civilisation and language.

And a 15-hour course in a second foreign language in:

- Spanish, German et Italian at Chambéry and Annecy (no beginners).
- Chinese and Japanese at Annecy (beginners accepted)

6.4. PROJ801 - Engineering Assistant Internship

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
			6	Soutenance, rapport écrit, évaluation entreprise

Language(s) for the course

- French

Course description

The 4th year internship is an application internship in a professional environment such as a technician or assistant engineer. The engineering student will be responsible for a specific study, the development or adaptation of new techniques or methods. This training period will be carried out in a company or organization whose activity is representative of the chosen specialty.

6.5. SHES802a - Integrated Management System QSE (Quality Safety Environment)

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
9	10.5		1.5	CC

Language(s) for the course

- French

Course description

The students must be aware that the quality management system, the environmental management system and the occupational health and safety management system are today inescapable in the company. It is thus necessary for them to have sufficient knowledge of these systems to take them into account and integrate them into their engineer's job.

6.6. SHES803a - Organization theory

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
13.5	6		1.5	CC

Language(s) for the course

- French

Course description

The content of this course is deliberately descriptive and follows a very clear chronology. The programme retraces the beginnings of organization management from the end of the XIXth century to today. The course thus analyzes the main theories, research and managerial progress made during the development of companies.

This module is divided into three main themes :

- The foundations of organization management (traditional approach and school of human relations);
- The concept of organizational structure using, for example, the works of Mintzberg which highlight the opportunities and constraints in terms of design, coordination and layout of a company;
- Organizational behavior with the notions of performance, diversity, conflict, negotiation, stress...

This is a basic course in the domain of management. Students can obtain a global overview of company management and thus understand the ins and outs.

Semester 9

UE	ECTS	Module	Course name	Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
UE901 : Engineering and design	7	ENER911	Physical model of Building (Option b)	7.5	13.5	24	1.5	CC
		GECH911	Advanced Structural Mechanics (Option a)	16	21	8	1.5	CC
		PROJ911	Multi-technical project - Design and studies			60	4	CC
UE902 : Process of organizing a construction operation	5	GECH913	Life cycle of a construction project	25.5	10.5		2.5	CC
		SHES911	Legislative context of building	42			2.5	CC
UE903 : Renewable Energy and Green building	8	ENER913	Solar Heat	16.5	19.5	12	3	CC(80%) TP(20%)
		ENER914	Photovoltaic Energy	13.5	22.5	8	2.5	CC
		GECH914	Wooden construction	12	27		3	CC
UE904 : Professional Environ- ment	10	LANG901a	English		40.5		2.5	CC
		LANG902a	Foreign Language (above TOEIC Level)		30		2.5	CC
		PROJ901a	R and D Project			40	6	Pratique + Rapport + Soutenance
		SHES901a	Management	15	7.5		1.5	CC

1. UE901 : Engineering and design

1.1. ENER911 - Physical model of Building (Option b)

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
7.5	13.5	24	1.5	CC

Language(s) for the course

- French

Course description

The course presents fundamental methods for modeling of energy systems in steady and transient states. These fundamentals are needed for application cases that are analyzed using simulation tools.

1.2. GECH911 - Advanced Structural Mechanics (Option a)

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
16	21	8	1.5	CC

Language(s) for the course

- French

Course description

This course is a new approach compared to previous courses. The course is concentrated on thin plate theory and displacement theory. An approach with all interested tools used in European standards is also presented. A second part will introduce the mechanical dynamics of buildings as well as the earthquake engineering.

1.3. PROJ911 - Multi-technical project - Design and studies

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
		60	4	CC

Language(s) for the course

- French

Course description

Students will apply the knowledge obtained during their studies and will integrate it into one multidisciplinary and multiparticipant project. They will simulate a real situation at the « study » stage. This project aims also to develop the notions of group work and project management, synthesis and analysis concerning economic, administrative and statutory aspects etc.

2. UE902 : Process of organizing a construction operation**2.1. GECH913 - Life cycle of a construction project**

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
25.5	10.5		2.5	CC

Language(s) for the course

- French

Course description

After introducing the progress of a construction operation, the building actors, the informations produced and exchanged, the notions of associated risk are discussed. The purpose of this teaching is to be able to apprehend and manage the essential concepts of existing building management.

2.2. SHES911 - Legislative context of building

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
42			2.5	CC

Language(s) for the course

- French

Course description

Statements of construction law.

3. UE903 : Renewable Energy and Green building**3.1. ENER913 - Solar Heat**

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
16.5	19.5	12	3	CC(80%) TP(20%)

Language(s) for the course

- French

Course description

Scientific and technical basis for the development of professional solar thermal energy projects in buildings.

3.2. ENER914 - Photovoltaic Energy

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
13.5	22.5	8	2.5	CC

Language(s) for the course

- French

Course description

Acquisition of scientific and technical skills necessary for professional applications of solar energy in the following fields:

- On grid photovoltaic generators and self consumption without battery
- Off grid photovoltaic generators and self consumption with battery

3.3. GECH914 - Wooden construction

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
12	27		3	CC

Language(s) for the course

- French

Course description

This course is devoted to the use of wood material as construction material. The first part deals with the design of structural elements according to the current standards (Eurocode 5 and national annex).

This module will also include a component on the specificities of wood constructions in terms of hygrothermal characteristics of the envelope (inertia, thermal bridges, moisture transfer, ...), as well as on the comfort inherent to the interior environments, and the life cycle analysis.

A final project will consolidate the knowledges of the students.

4. UE904 : Professional Environment**4.1. LANG901a - English**

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
	40.5		2.5	CC

Language(s) for the course

- English

Course description

Our students are trained to enter the professional world where it is essential to be able to work in English. All four language skills (listening and reading, writing and speaking) are regularly practised. Our students are placed in learning contexts and situations where they can keep fine tuning their comprehension and communication skills, through role plays and debates, mock interviews, professional projects...,etc.

4.2. LANG902a - Foreign Language (above TOEIC Level)

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
	30		2.5	CC

Course description

A 15-hour course in English: Culture, civilisation and language.

And a 15-hour course in a second foreign language in:

- Spanish, German et Italian at Chambéry and Annecy (no beginners).

- Chinese and Japanese at Annecy (beginners accepted)

4.3. PROJ901a - R and D Project

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
		40	6	Pratique + Rapport + Soutenance

Language(s) for the course

- French

Course description

This work consists of an introduction to fundamental or applied research. It is carried out in pairs on a subject proposed by the industrial world or by a research laboratory. The first part of the project concerns a state of the art of knowledge and/or techniques on the subject, the identification of the method and/or technique that will be implemented as part of the project, and the development of an experience or work plan to address the problem.

The second part of the work concerns the realization of the study and the analysis of the results

4.4. SHES901a - Management

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
15	7.5		1.5	CC

Language(s) for the course

- French

Course description

Course description: This SHES course is made up of 2 independent modules : Management and Ethics. The objective of this module is to grasp the human and communication aspects of management and to develop the students' managerial assertion

Semester 10

UE	ECTS	Module	Course name	Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
UE001 : Internship	30	PROJ001	Internship				30	Soutenance, rapport écrit, évaluation entreprise

1. UE001 : Internship

1.1. PROJ001 - Internship

Class (h)	Exer. (h)	Lab. (h)	Weight	Examination
			30	Soutenance, rapport écrit, évaluation entreprise

Language(s) for the course

- French

Course description

This Internship takes place in a company in which engineering students have one (or more) task (s) to achieve, close (s) to his future engineering function, integrating a project approach with technical, economic and social aspects. These aspects should be highlighted in the written and oral presentation of the course even if the engineering student has not been the direct actor.