





## FSA1BA - Teaching profile

### Learning outcomes

#### General objectives

The bachelor's programme in Engineering Sciences : Engineering, leads to the degree of "Bachelor of Engineering Sciences : Engineering" of the French-speaking Community of Belgium. Upon successful completion of this first cycle of studies, the student will have access to one or several titles in Engineering Sciences, awarded by the Faculty of Applied Sciences, by doing one of the corresponding master's programmes.

The general objectives of the bachelor's programme in Engineering Sciences are, therefore, aimed at the acquisition of :

- lasting scientific knowledge : a solid grounding in the sciences as well as the practice and integration of previously acquired knowledge
- a solid basis in specialised studies, entitling access to a master's (either at UCL, within the French-speaking Community or abroad) : progressive orientation, one or two specialisations in Engineering Sciences
- high level competence and skills : analysis, critical spirit, self-evaluation, conception (of models, tools, systems, processes and procedures), sound written and oral communication skills and professional team-work qualities. The programme is designed to integrate the necessary skills within a pluridisciplinary context (including the Human Sciences, Ethics, the Environment and Sustainable Development).

On successful completion of this programme, each student is able to :

démontrer la maîtrise d'un corpus de connaissances en sciences fondamentales et polytechniques, lui permettant de résoudre des problématiques disciplinaires cadrées (Axe 1).

1.1. Appliquer les concepts, lois, raisonnements à une problématique disciplinaire de complexité cadrée.

1.2. Décrire des outils de modélisation et de calcul adéquats pour résoudre une problématique disciplinaire cadrée.

d'organiser et de mener à son terme une démarche d'ingénierie appliquée au développement d'un produit (et/ou d'un service) répondant à un besoin ou à une problématique cadrée, à l'analyse d'un phénomène physique donné, un système (Axes 2 et 3).

2.1. Décrire et formuler le problème à résoudre ou le besoin fonctionnel sous la forme d'un cahier des charges générique.

2.2. Se documenter sur l'état des connaissances actuelles dans le domaine de la problématique posée.

2.3. Poser des hypothèses de travail pour la modélisation d'une problématique cadrée.

2.4. Modéliser un problème et concevoir une ou plusieurs solutions techniques répondant au cahier des charges.

2.5. Implémenter et tester une solution sous la forme d'une maquette, d'un prototype et/ou d'un modèle numérique.

2.6. Synthétiser en vue d'explicitation : les hypothèses, la modélisation et la solution proposée.

2.7. Porter un regard critique sur des hypothèses prises et sur la pertinence des solutions (autoévaluation individuelle).

2.8. Formuler des recommandations pour améliorer la solution étudiée, le système analysé.

de contribuer, en équipe, à la réalisation d'un **projet disciplinaire ou pluridisciplinaire** en respectant une approche cadrée.

3.1. Etablir et s'engager collectivement sur un plan de travail, un échéancier, des fonctions et des rôles, s'y engager, pour mettre en oeuvre des tâches du projet.

3.2. S'autoévaluer de manière critique, continue et collaborative en vue de fonctionner efficacement en équipe.

de communiquer efficacement oralement et par écrit les résultats des missions qui lui sont confiés. Il sera capable communiquer en anglais en plus du français.

4.1. Argumenter et convaincre au sein de l'équipe et vis-à-vis des enseignants et des jurys.

4.2. Communiquer sous forme graphique et schématique ; interpréter un schéma, présenter les résultats d'un travail, structurer des informations.

4.3. Lire, analyser et exploiter des documents techniques (normes, plans, cahier de charge, spécifications, ...).

4.4. Rédiger des documents écrits de synthèse en tenant compte des exigences posées dans le cadre des missions (projets et problèmes).

4.5. Faire un exposé oral convaincant en utilisant les techniques modernes de communication.

de faire preuve de rigueur et d'esprit critique dans ses démarches scientifiques et techniques en **se souciant de l'éthique**.

5.1 Utiliser des ressources bibliographiques pour réaliser et argumenter un travail, en tenant compte des règles éthiques.

5.2 Intégrer dans une démarche d'ingénierie des préoccupations sociétales, éthiques et environnementales.

### Programme structure

The bachelor's programme in Engineering Sciences: Engineering, includes 180 credits spread over 3 years:

- A basic science education of 120 credits,
- Two specialized training streams (30 credits each), one of these streams can be replaced by an opening minor.

The student has the possibility of choosing two courses in engineering sciences, each in a different orientation. The purpose of this dual track system is to enable students who so wish to have basic training in two engineering science specialities, increasing their technical versatility, or preparing for a master's degree in civil engineering in a field relating to several of the basic orientations offered at the level of the bachelor's program. The distribution of volumes for polytechnic courses is 10 credits in the second annual block and 20 credits in the third annual block.

The student has the possibility to replace one of the specialization tracks by [an accessible opening minor](#).

The seven different specialization tracks in Engineering Sciences are :

- 1. Biomedical Engineering:** The aim of this track is initiating the students to the multidisciplinary field of biomedical engineering. First, this requires an introduction to the different disciplines of life sciences (biology, anatomy, biochemistry, etc.). Next, a familiarization with fundamental challenges from the different pillars of biomedical engineering will be provided (bioinstrumentation, biomaterials, biomechanics, artificial organs, medical imaging, biological systems modeling, etc.). The students will then be able to deploy these skills in order to solve basic problems in biomedical engineering.
- 2. Civil Engineering:** The aim of this track is initiating the students to the basic concepts of civil engineering. In addition to the theoretical fundamentals about structures, materials, soil mechanics and hydraulics, the students will be immersed in the "civil engineering culture" and will acquire concrete experience by practical and laboratory works, basic projects and site visits.
- 3. Electricity:** The aim of this track is initiating the students to the basic concepts of electrical sciences and providing them the fundamental notions in the scientific and technical fields linked to electricity and its applications. More precisely the students will discover the fundamentals of electromagnetics and physical phenomena forming the basis of electronic devices working ; as well as the basic concepts of electronics, telecommunications, and electrodynamic converters.
- 4. Mechanics:** The aim of this track is to enable the students to increase and broaden their knowledge and skills in different areas of Mechanical Engineering. More specifically, this programme offers the students the opportunity to build a solid background knowledge of continuum mechanics (fluid and solid mechanics) and thermodynamics, both from the theoretical and the applied standpoints. Further, it offers applied but rigorous training in machine design, analysis of machine components and manufacturing. Finally, this programme allows the students to develop a strong expertise in mathematical modelling and methods for numerical simulation.
- 5. Computer science:** The aim of this track is to enable the students to master the basic concepts in the field of computer sciences. More precisely this specialization trains the students to acquire basic fundamentals in computer sciences (algorithmic and data structures, computer languages, informatic systems, databases); and the capacity to analyze and solve algorithmic problems by applying its knowledge in the field of computer and engineering sciences.
- 6. Applied Mathematics:** The aim of this track is to enable the students to increase and improve their knowledge and skills in various fields of applied mathematics and to understand their basic concepts. More precisely this specialization trains the students in the design, analysis and implementation of mathematical models for engineering sciences in the industry, and in the elaboration of effective strategies to optimise their performance.
- 7. Applied Chemical and Physics:** The aim of this track is to enable the students to build a broad knowledge skills base in applied chemistry and physics (including thermodynamics and kinetics) opening avenues to the main fields of chemical and environmental engineering, advanced materials engineering, as well as physical engineering. The acquired skills cover a wide range of physical scales, from atomic to macroscopic and industrial dimensions, and prepare to the professions of the engineering master in chemistry and materials science swell as the master in physical engineering (chemical and environmental engineering, sustainable chemistry and energy, nanotechnology, (nano)electronics, optics, advanced materials including biomaterials, sensors and transducers, etc.).

## FSA1BA Programme

### Detailed programme by subject

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- Mandatory
  - ✘ Optional
  - △ Not offered in 2023-2024
  - ⊙ Not offered in 2023-2024 but offered the following year
  - ⊕ Offered in 2023-2024 but not the following year
  - △ ⊕ Not offered in 2023-2024 or the following year
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				Year		
				1	2	3
<input checked="" type="radio"/> LEPL1502	Project 2	David Bol Jérôme Louveaux Claude Oestges (coord.)	[q2] [30h+30h] [5 Credits]	x		
<input checked="" type="radio"/> LEPL1503	Project 3	Olivier Bonaventure (coord.)				



Year

1 2 3

⌘ LTHEO2840	Science and Christian faith	
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## List of available minors

The student can choose to replace one of his-her specialization tracks by a non-polytechnic opening minor. The list of accessible minors is below. The choice has to be made before the beginning of the second annual unit.

- > Specialization track in applied Chemistry and Physics [ en-prog-2023-filfyki ]
- > Specialization track in Construction [ en-prog-2023-filgce ]
- > Specialization track in Electricity [ en-prog-2023-filelec ]
- > Specialization track in Biomedical Engineering [ en-prog-2023-filgbio ]
- > Specialization track in Computer Science [ en-prog-2023-fillinfo ]
- > Specialization track in Applied Mathematics [ en-prog-2023-filmap ]
- > Specialization track in Mechanics [ en-prog-2023-filmeca ]
- > Minor in Scientific Culture [ en-prog-2023-mincults ]
- > Minor in Geography [ en-prog-2023-mingeog ]
- > Minor in Mathematics [ en-prog-2023-minmath ]
- > Minor in Physics [ en-prog-2023-minphys ]
- > Minor in Statistics, Actuarial Sciences and Data Sciences [ en-prog-2023-minstat ]
- > Minor in Urban Architecture [ en-prog-2023-minarch ]
- > Minor in Development and Environment [ en-prog-2023-mindenv ]
- > Minor : Issues of Transition and Sustainable Development (\*) [ en-prog-2023-mindd ]
- > Minor in Economics [ en-prog-2023-minecon ]
- > Minor in entrepreneurship (\*) [ en-prog-2023-minmpme ]
- > Minor in Gender Studies [ en-prog-2023-mingenre ]
- > Minor in European Studies [ en-prog-2023-mineuro ]
- > Minor in Mangement (basic knowledge) [Programme pour les étudiants de l'EPL exclusivement] [ en-prog-2023-minogest-version-EPL ]
- > Minor in Information and Communication [ en-prog-2023-mincomu ]
- > Minor in Human and Social Sciences [ en-prog-2023-minhuso ]
- > Minor in Law (access) [ en-prog-2023-minadroi ]
- > Minor in Law (openness) [ en-prog-2023-minodroi ]
- > Minor in Culture and Creation [ en-prog-2023-mincucrea ]
- > Minor in Literary Studies [ en-prog-2023-minlitt ]
- > Minor in Dutch Studies (\*) [ en-prog-2023-minneer ]
- > Minor in Musicology [ en-prog-2023-minmusi ]
- > Minor in Philosophy [ en-prog-2023-minfilo ]
- > Minor in Biomedicine (openness) [ en-prog-2023-minsbim ]

(\*) This programme is the subject of access criteria



○ LEPL1102	Analysis	François Glineur (coord.) Raphaël Jungers Jean-François Remacle Michel Verleysen	PR [q1] [30h +30h] [5 Credits] 
○ LEPL1201	Physics I	Laurent Francis Dimitri Lederer (coord.) Vincent Legat Thomas Pardoën	PR [q1] [30h +30h] [5 Credits] 
○ LEPL1501	Project 1	Xavier Bollen (compensates Benoît Raucent) Charles Pecheur Benoît Raucent Renaud Ronsse Sandra Soares Frazao (coord.)	PR [q1] [30h +30h] [5 Credits] 

⌘ LALLE1101	German beginner's level 1st part (0-A1)	Fanny Desterbecq (compensates Ann Rinder)	DIP [q1 or q2] [45h] [2 Credits] 
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## ***FSA1BA - 2ND ANNUAL UNIT***

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- Mandatory
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⌘ LESPA1301	Spanish intermediate level, 1st part (A2-B1.1)	Begona Garcia Migura (coord.) Alicia Maria Tirado Fernandez (coord.)	ES [q1 or q2] [45h] [3 Credits] 🌐
⌘ LESPA1302	Spanish intermediate level, 2nd part (B1.1-B1.2)	Alicia Maria Tirado Fernandez (coord.)	ES [q2] [45h] [3 Credits] 🌐

**O Religion courses for students in exact sciences**

The students select one course between:



## FSA1BA - 3RD ANNUAL UNIT

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- Mandatory
- ✂ Optional
- △ Not offered in 2023-2024
- ⊖ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🌐 Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

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[Click on the course title to see detailed informations \(objectives, methods, evaluation...\)](#)

### o **Obligatory Courses**

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#### o **General Courses**

⌘ LEPL1511



**FSA1BA - Information**

**Access Requirements**

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- For any secondary school diploma **from a European Union country**, the admission request must contain the equivalence of your diploma or, at the very least, proof of the filing of the equivalence request with the Wallonia-Brussels Federation (French Community of Belgium). For any information relating to obtaining an equivalence, please refer to [the following site](#).
- For any secondary school diploma **from a country outside the European Union**, the admission application must contain the [equivalence of your diploma](#) issued by the Wallonia-Brussels Federation (French Community of Belgium). If you have a restrictive equivalence for the programme of your choice, in addition of it, you **must** have either the [DAES](#) or a certificate of successful completion of the [examination giving access to 1<sup>st</sup> cycle studies](#) when you submit your application

## Access based on validation of professional experience

Admission to undergraduate studies on the basis of accreditation of knowledge and skills obtained through professional or personal experience (Accreditation of Prior Experience)

Subject to the general requirements laid down by the authorities of the higher education institution, with the aim of admission to the undergraduate programme, the examination boards accredit the knowledge and skills that students have obtained through their professional or personal experience.

This experience must correspond to at least five years of documented activity, with years spent in higher education being partially taken into account: 60 credits are deemed equivalent to one year of experience, with a maximum of two years being counted. At the end of an assessment procedure organized by the authorities of the higher education institution, the Examination Board will decide whether a student has sufficient skills and knowledge to successfully pursue undergraduate studies.

After this assessment, the Examination Board will determine will dedication

## Teaching method

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Les étudiant-e-s bacheliers ingénieur civil se voient proposer un programme basé sur la "pédagogie active" qui les amène à prendre une part active dans la gestion de leur formation. Des dispositifs pédagogiques variés sont mis en place chaque année de manière collégiale par les titulaires de cours et en collaboration avec la cellule de coordination pédagogique, et comportent des cours magistraux, des APP (apprentissage par problèmes et par projets), des séances d'exercices, des travaux individuels et de groupe.

In the context of the projects and certain other subject activities, the student will be closely followed in his studies throughout the whole process, in an effort to situate himself appropriately with respect to his individual work and group work and make any necessary readjustments. On the other hand, he will be evaluated during the course of the quadrimester (ongoing evaluation) and again at the end of the quadrimester for each of the subjects taken, to ascertain whether he fulfils the demands of the programme and has completed the modules concerned successfully. These evaluations are both written and oral. The specific details and procedures for the ongoing evaluation are explained at the beginning of each period of the study programme.

## Possible trainings at the end of the programme

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### Access to the master's of Engineering Sciences - Engineering

The bachelor's programme in Engineering entitles direct access to the master's programme in Engineering, in the orientation corresponding to one of the specialization tracks followed (otherwise prerequisites could be required)

After having accumulated 120 credits spread over 2 years, the student will obtain the title of Master of Engineering Sciences, which is conferred jointly with the professional title of Engineer.

The Ecole Polytechnique de Louvain offers ten different orientations for these studies :

- [Master \[120\] in Civil Engineering](#)
- [Master \[120\] in Chemical and Materials Engineering](#)
- [Master \[120\] in Physical Engineering](#)
- [Master \[120\] in Electrical Engineering](#)
- [Master \[120\] in Electro-mechanical Engineering](#)
- [Master \[120\] in Mechanical Engineering](#)
- [Master \[120\] in Computer Science and Engineering](#)
- [Master \[120\] in Mathematical Engineering](#)
- [Master \[120\] in Biomedical Engineering](#)
- [Master \[120\] in Data Science Engineering](#)
- [Master \[120\] in Energy Engineering](#)

## Contacts

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### Curriculum Management

Entity

Structure entity	SST/EPL/BTCI
Denomination	<a href="#">(BTCI)</a>
Faculty	Louvain School of Engineering ( <a href="#">EPL</a> )
Sector	Sciences and Technology ( <a href="#">SST</a> )
Acronym	BTCI
Postal address	Croix du Sud 1 - bte L6.11.01 1348 Louvain-la-Neuve

Academic supervisor: [Vincent Legat](https://uclouvain.be/repertoires/vincent.legat) (<https://uclouvain.be/repertoires/vincent.legat>)

Jury

- Président du Jury: [Claude Oestges](https://uclouvain.be/repertoires/claude.oestges) (<https://uclouvain.be/repertoires/claude.oestges>)
- Secrétaire du Jury: [Paul Fisette](https://uclouvain.be/repertoires/paul.fisette) (<https://uclouvain.be/repertoires/paul.fisette>)

Useful Contact(s)

- Secrétariat: [Catherine Peeters](https://uclouvain.be/repertoires/catherine.peeters) (<https://uclouvain.be/repertoires/catherine.peeters>)
- Conseillère aux études: [Isabelle Poty](https://uclouvain.be/repertoires/isabelle.poty) (<https://uclouvain.be/repertoires/isabelle.poty>)

