FSA1BA - Introduction

Introduction

Introduction

After passing the admission test you will start your cursus with the bachelor's programme in Engineering Sciences [180]. This programme offers a basic science education and a specific training in Engineering sciences.

During the second annual unit, you will opt for two different trainings in specialized Polytechnics. These specialization tracks enable you to get acquainted with two specialties in Engineering Sciences and to prepare you for a specialized master. Seven different specialization tracks are available: Applied Chemistry and Physics, Construction, Electricity, Computer Sciences, Biomedical Engineering, Applied Mathematics and Mechanics.

The student has the possibility to replace one of these tracks by an accessible opening minor.

Your profile

Following a strong math and science education during high school is recommended.

Your future job

All industrial sectors need civil engineers: the chemical industry, pharmaceutical and food industries, electronics and telecommunications industries, metallurgy, aeronautics, construction and engineering, large scale distribution, banking and consulting services, nanotechnologies and medical technologies, etc.

They play a role as researchers and developers, are responsible for production or management and hold jobs in marketing and sales (of advanced technological products).

We find civil engineers in departments of finance, information technology, training or quality control, the public sector, higher education, or in the Ministry of equipment and transportation. (www.fabi.be)

Your programme

The programme offers :

- a strong scientific education in : mathematics, physics, chemistry, computer science, numerical computation, probabilities and statistics, ...
- a problem-based learning in small groups
- a training in concrete problem analyzing, looking for missing items, and developing your own solutions
- engineering projects management, from the conception to completion
- high-level skills: analysis, critical thinking, communication, team working, conception in a multididciplinary context.

Once bachelor, you will continue your training by one of the following Masters: Biomedical Engineering, Chemical and Materials Engineering, Civil Engineering, Computer science, Data Sciences Engineering, Physical Engineering, Mechanical Engineering, Electrical Engineering, Electro-mechanical Engineering, Mathematical Engineering and Energical Engineering.

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'expliciter : 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 fundaments 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 fundaments 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 fundaments 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

- Mandatory
- Optional
- Not offered in 2024-2025
- Not offered in 2024-2025 but offered the following year
- Offered in 2024-2025 but not the following year
- Not offered in 2024-2025 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, ...)

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

Year

				Year 1	2	3
LEPL1503	Project 3	Olivier Bonaventure Benoît Legat	FR [q2] [30h+30h] [5 Credits]		x	
LEPL1301	Chemistry and Physical chemistry 1	Sophie Demoustier Alain Jonas (compensates Francesco Contino) Bernard Nysten	FR [q2] [30h+30h] [5 Credits]	x		
LEPL1302	Chemistry and Physical chemistry 2	Hervé Jeanmart Joris Proost	FR [q1] [30h+30h] [5 Credits]		x	
LEPL1402	Informatics 2	Sébastien Jodogne Ramin Sadre Pierre Schaus	FR [q1] [30h+30h] [5 Credits]		x	

Non-disciplinary Courses

LANGL1373

Year
1 2 3

English courses (7 credits)

LANGL1171	Anglais pour ingénieurs civils I *A placement test is organized at the beginning of the annual unit 1 and 2. Depending on the obtained mark, the students follow an adapted course. The students with a mark gretaer or equal to 16/20 keep their mark and could take an additional language course (out of the 180 credits); this additional course will only affect their average mark if credited (mark greater or equal to 10/20)*	Charline Coduti (compensates Anne-Julie Toubeau) Hila Peer Marc Piwnik Nevin Serbest (coord.)	EN [q1] [12h] [2 Credits]	x		
LANGL1272	Anglais pour ingénieurs civils II *A placement test is organized at the beginning of the annual unit 1 and 2. Depending on the obtained mark, the students follow an adapted course. The students with a mark gretaer or equal to 16/20 keep their mark and could take an additional language course (out of the 180 credits); this additional course will only affect their average mark if credited (mark greater or equal to 10/20)*	Jean-Luc Delghust Adrien Kefer Sabrina Knorr Charlotte Peters (coord.) Marc Piwnik (coord.)	EN [q1] [30h] [3 Credits]		x	
LANGL1373	English for engineers 3	Ahmed Adrioueche (coord.) Stéphanie Brabant Nicholas Gibbs Ariane Halleux Sandrine Meil 1 1 l h W n 1 G9d.L-22.676001 l 89.9 1 l 1 1 l h W n 1 G [] 0 d 2 w 0 0				

				Year 1	2	3
LTHEO2840	Science and Christian faith	Benoît Bourgine Paulo Jorge Dos Santos Rodrigues	FR [q1] [15h] [2 Credits]		x	
LTECO2200						

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

Course prerequisites

The **table** below lists the activities (course units, or CUs) for which there are one or more prerequisites within the programme, i.e. the programme CU for which the learning outcomes must be certified and the corresponding credits awarded by the jury before registering for that CU.

These activities are also identified **in the detailed programme**: their title is followed by a yellow square.

Prerequisites and student's annual programme

As the prerequisite is for CU registration puposes only, there are no prerequisites within a programme year. Prerequisites are defined between CUs of different years and therefore influence the order in which the student will be able to register for the programme's CUs.

In addition, when the jury validates a student's individual programme at the beginning of the year, it ensures its coherence, meaning that it may:

- require the student to combine registration in two separate CUs which it considers necessary from a pedagogical point of view.
- transform a prerequisite into a corequisite if the student is in the final year of a degree course.

For more information, please consult the Academic Regulations and Procedures.

 # Prerequisities list

LANGL1272 "Anglais pour ingénieurs civils II" has prerequisite(s) LANGL1171

- LANGL1171 - Anglais pour ingénieurs civils I

LEPL1402 "Informatique 2" has prerequisite(s) LEPL1401

- LEPL1401 - Informatics 1

The programme's courses and learning outcomes

For each UCLouvain training programme, a reference framework of learning outcomes specifies the the skills expected of every graduate on completion of the programme. Course unit descriptions specify targeted learning outcomes, as well as the unit's contribution to reference framework of learning outcomes.

Detailed programme per annual block

FSA1BA - 1ST ANNUAL UNIT

- Mandatory
- Optional
- Not offered in 2024-2025
- Not offered in 2024-2025 but offered the following year
- Offered in 2024-2025 but not the following year
- Not offered in 2024-2025 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, ...)

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

Obligatory Courses

LEPL1201	Physics I	Laurent Francis Dimitri Lederer Vincent Legat Thomas Pardoen	FS [q1] [30h +30h] [5 Credits]
LEPL1501	Project 1	Xavier Bollen (compensates Benoît Raucent) Charles Pecheur Benoît Raucent Renaud Ronsse Sandra Soares Frazao (coord.)	

⊠ LALLE1102	German beginner's level 2nd part (A1 - A2)	Caroline Klein (coord.)	FR [q2] [45h] [2 Credits]

⊠ Spanish Courses

⊠ LESPA1101	Spanish beginner's level 1st part (0-A1)	Begona Garcia Migura Fernando Juan San Basilio Pardo Alicia Maria Tirado Fernandez (coord.)	ES [q1 or q2] [45h] [2 Credits]
⊠ LESPA1102	Spanish (beginner¿s level) 2nd part (A1 - A2)	Alicia Maria Tirado Fernandez (coord.)	ES [q1 or q2] [45h] [2 Credits]

⊠ LESPA1301	Spanish intermediate level, 1st part (A2-B1.1)	Begona Garcia Migura (coord.)	ES [q1 or q2] [45h] [3 Credits]
⊠			

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⊠ LEPL1508	Project 4 (in electricity)	Christophe Craeye (coord.) Dimitri Lederer Luc Vandendorpe	FR [q2] [30h +22.5h] [5 Credits]
⊠ LEPL1509	Project 4 (in informatics)	Hélène Verhaeghe	FR [q2] [30h +22.5h] [5 Credits]
⊠ LEPL1510	Project 4 (in construction)	Pierre Latteur	FR [q2] [30h +22.5h] [5 Credits]
⊠ LEPL1511	Project 4 (in business projects creation)	Julien Hendrickx (coord.)	FR [q2] [30h +22.5h] [5 Credits]
⊠ LSST1001	IngénieuxSud	Stéphanie Merle Jean-Pierre Raskin	FR [q1+q2] [15h +45h] [5 Credits]

Language Courses

English courses

LANGL1373	English for engineers 3	Ahmed Adrioueche (coord.) Stéphanie Brabant Nicholas Gibbs Ariane Halleux Sandrine Meirlaen Yannick Paquin Charlotte Peters (coord.) Nevin Serbest Florence Simon	EN [q1] [30h] [2 Credits]

Minor or additional module

Maximum 2 element(s)

FSA1BA - Information

Teaching method

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 (apprentissages par problèmes et par projets), des séances d'exercices, des travaux individuels et de groupe.

Ces dispositifs placent les étudiant·e·s au centre de leurs apprentissages et visent à leur faire acquérir l'ensemble des compétences, des attitudes génériques (c'est-à-dire transversales aux champs disciplinaires) nécessaires pour mener à bien les études d'ingénieur civil et pour entreprendre une carrière professionnelle. Cette méthodologie est définie en cohérence avec les acquis d'apprentissage visés du programme de bachelier.

Les activités proposées au sein des enseignements permettent aux étudiant·e·s de découvrir ou d'exploiter des notions connues mais retravaillées dans un contexte neuf, d'engranger des acquis méthodologiques allant de pair avec un travail d'intégration, d'approfondissement et d'enrichissement des connaissances. Les étudiant·e·s sont initié·e·s au travail coopératif en groupe, à la gestion de leurs apprentissages, à la communication orale et écrite,...

Semaine de lancement S0 (P0)

Pour aborder les objectifs de formation méthodologique dès le début des études, la première semaine du premier bloc annuel du programme de bachelier est une semaine de lancement dénommée P0 présentant une organisation particulière. Les objectifs poursuivis durant cette semaine sont :

- Accueil des étudiant·e·s dans la Faculté ;
- Découverte de l'environnement universitaire et facultaire du site de Louvain-la-Neuve ;
- Initiation méthodologique à certains aspects du travail en équipe, de l'apprentissage par problèmes et par projets (APP).

Apprentissage par projets

Les projets du programme de bachelier visent à intégrer différentes matières du quadrimestre dans une même réalisation. Il ne s'agit donc pas de projets d'application des connaissances acquises précédemment, mais de projets d'apprentissage en interaction permanente avec les disciplines enseignées en parallèle suivant le modèle ci-après :

Apprentissage par problèmes

Au sein des différentes disciplines, des projets motivantes, actuels et interpellants sont proposées aux étudiant·e·s qui ne possèdent cependant pas toujours les compétences nécessaires pour y répondre. Ils nécessitent et amènent donc l'étudiant·e à travailler en groupe, à collaborer et à effectuer des recherches scientifiques, à planifier son travail et à s'organiser.

Ces deux types de situations problèmes coexistent et se complètent : le problème (disciplinaire et de courte durée) et le projet (plurisdisciplinaire et se déroulant sur un quadrimestre).

Evaluation

The evaluation methods comply with the regulations concerning studies and exams. More detailed explanation of the modalities specific to each learning unit are available on their description sheets under the heading "Learning outcomes evaluation method".

The course activities are evaluated in accordance with the prevailing rules of the University (c.f. exam regulations).