CENTRALE NANTES

BACHELOR OF SCIENCE IN ENGINEERING

2025-2026

3e année

PROGRAMME SUPERVISOR

Grégory LEGRAIN

PROGRAMME BACHELOR OF SCIENCE IN ENGINEERING - 3e année

1er Semestre

Course unit	ECTS Credits	Course type	Course code	Title
UE51	4			
		Required course	BSC_CONTMECH	Continuum Mechanics
		Required course	BSC_CONTMECH	Continuum Mechanics
		Required course	BSC_FLUM2	Fluid mechanics 2
		Required course	BSC_FLUM2	Fluid mechanics 2
		Required course	BSC_HEATTRANS 2	Heat transfer 2
		Required course	BSC_HEATTRANS 2	Heat transfer 2
		Required course	BSC_MECHCENG	Mechanics for Civil Engineering Structures and Infrastructures
		Required course	BSC_MECHCENG	Mechanics for Civil Engineering Structures and Infrastructures
UE52	3			
		Required course	BSC_FEM	Finite Element Method
		Required course	BSC_FEM	Finite Element Method
		Required course	BSC_ROBOTICS	Robotics
		Required course	BSC_ROBOTICS	Robotics
		Required course	BSC_SIGPROC	Signal Processing
		Required course	BSC_SIGPROC	Signal Processing
UE53	3			
		Elective course	BSC_FLUIDNRJ	Focus project 1 – Fluids & Energy
		Elective course	BSC_FLUIDNRJ	Focus project 1 – Fluids & Energy
		Elective course	BSC_FOCUS1_CE NG	Focus project 1 – Civil Engineering
		Elective course	BSC_FOCUS1_CE NG	Focus project 1 – Civil Engineering
		Elective course	BSC_FOCUS1_M ENG	Focus project 1 – Mechanical Engineering
		Elective course	BSC_FOCUS1_M ENG	Focus project 1 – Mechanical Engineering
		Elective course	BSC_FOCUS1_SI GCORO	Focus project 1 – Signal, Control & Robotics
		Elective course	BSC_FOCUS1_SI GCORO	Focus project 1 – Signal, Control & Robotics
UE54	4			
		Elective course	BSC_ALL5	LVC 5 - German
		Elective course	BSC_ALL5	LVC 5 - German
		Required course	BSC_BUSEN5	Business English 5
		Required course	BSC_BUSEN5	Business English 5
		Elective course	BSC_ESP5	LVC 5 - Spanish
		Elective course	BSC_ESP5	LVC 5 - Spanish
		Elective course	BSC_FLE5	FLE 5 - French as a foreign language

Établissement public sous tutelle du ministère de l'Enseignement supérieur, de la Recherche et de l'Innovation
GROUPE DES ÉCOLES CENTRALE
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Course unit	ECTS Credits	Course type	Course code	Title
		Elective course	BSC_FLE5	FLE 5 - French as a foreign language
		Required course	BSC_PREPRO5	Pre-professionnal activities 5
		Required course	BSC_PREPRO5	Pre-professionnal activities 5
		Required course	BSC_SHS5	SHS5
		Required course	BSC_SHS5	SHS5

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2e Semestre

Course unit	ECTS Credits	Course type	Course code	Title
UE61	12			
		Elective course	BSC_FLUIDNRJ	Focus project 2 – Fluids & Energy
		Elective course	BSC_FLUIDNRJ	Focus project 2 – Fluids & Energy
		Elective course	BSC_FOCUS2_CENG	Focus project 2 – Civil Engineering
		Elective course	BSC_FOCUS2_CENG	Focus project 2 – Civil Engineering
		Elective course	BSC_FOCUS2_MENG	Focus project 2 – Mechanical Engineering
		Elective course	BSC_FOCUS2_MENG	Focus project 2 – Mechanical Engineering
		Elective course	BSC_FOCUS2_SIGCORO	Focus project 2 – Signal, Control & Robotics
		Elective course	BSC_FOCUS2_SIGCORO	Focus project 2 – Signal, Control & Robotics
UE62	2			
		Required course	BSC_BUSEN5	Research Methodology and Practice
		Required course	BSC_BUSEN5	Research Methodology and Practice
UE63	1			
		Elective course	BSC_ALL6	LVC 6 - German
		Elective course	BSC_ALL6	LVC 6 - German
		Elective course	BSC_ESP6	LVC 6 - Spanish
		Elective course	BSC_ESP6	LVC 6 - Spanish
		Elective course	BSC_FLE6	FLE 6 - French as a foreign language
		Elective course	BSC_FLE6	FLE 6 - French as a foreign language
UE64	14			
		Required course	BSC_BSCTHESIS	Bachelor Final Internship
		Required course	BSC_BSCTHESIS	Bachelor Final Internship

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Autumn Semester - UE51

Fluid mechanics 2 [BSC_FLUM2]

LEAD PROFESSOR(S): Laëtitia PERNOD

Requirements

Fluid Mechanics 1

Objectives

This course provides the students with a presentation of Navier-Stokes equations and some classical classes/models of flows, in particular the perfect flow assumption and associated Bernoulli's equations.

Course contents

1. Navier-Stokes equations
2. Dimensional analysis and characteristic numbers
3. Classes of flow (based on geometry and kinematic property)
4. Ideal regions of flow

Course material

[1] F. WHITE (2010), Fluid Mechanics, 7th ed., McGraw-Hill
[2] MUNSON, YOUNG, OKIISHI, (2009), Fundamentals of Fluid Mechanics, 7th ed., Wiley
[3] CENGEL, CIMBALA, (2006), Fluid Mechanics - Fundamentals and Applications, McGraw-Hill

Assessment

Collective assessment: EVC 1 (coefficient 0.3)

Individual assessment: EVI 1 (coefficient 0.7)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	3	8 hrs	14 hrs	null hrs	0 hrs	2 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Autumn Semester - UE51

Heat transfer 2 [BSC_HEATTRANS2]

LEAD PROFESSOR(S): Ernesto MURA

Requirements

Objectives

Analysing and modelling of heat transfers problems related to industrial common applications

Course contents

Conduction, convection, and mixed heat transfer, focusing on practical engineering problems. Multidimensional and transient conduction, internal and external forced convection, and natural convection using analytical and empirical methods. Combined conduction-convection scenarios (fins and insulated systems). Radiation is briefly approached. Students apply finite difference methods to solve basic heat transfer problems numerically.

Course material

Transport phenomena, Bird and Stewart, wiley 2007
Convection Heat Transfer, A. Bejan, 3rd edition. Wiley (2004)
Principles of Heat Transfer, M. Kaviany (2002)

Assessment

Individual assessment: EVI 1 (coefficient 0.7)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	3	8 hrs	14 hrs	null hrs	0 hrs	2 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Autumn Semester - UE51

Mechanics for Civil Engineering Structures and Infrastructures [BSC_MECHCENG]

LEAD PROFESSOR(S): Syed Yasir ALAM

Requirements

Statics, Material Science, Structural Mechanics

Objectives

Students will learn how loads act on civil engineering structures and infrastructures and how these are transmitted through beams, frames, columns, and soils. They will be able to analyse and evaluate the stability, strength, and serviceability of structures using mechanics principles.
Students will be introduced to Eurocodes and design principals.
By the end, they will be able to apply mechanics with engineering judgment to solve civil engineering problems.

Course contents

- Introduction to Civil Engineering Structures: Overview of civil structures, types of loads (dead, live, wind, traffic), and Eurocode design philosophy.
- Civil Engineering Materials – Part 1: Properties, behaviour, and selection of concrete and steel for structural applications.
- Civil Engineering Materials – Part 2: Reinforcement, composite materials, and durability considerations.
- Concrete Structures – Part 1: Mechanics of reinforced concrete beams and slabs; stress, strain, and bending behaviour.
- Concrete Structures – Part 2: Simple design examples of beams and slabs; serviceability and safety checks.
- Steel Structures – Part 1: Mechanics of steel beams, columns, and trusses; axial, bending, and shear behaviour.
- Steel Structures – Part 2: Basic design and analysis of steel members; safety and serviceability according to Eurocodes.
- Integrated Case Study / Mini Project: Apply concrete and steel concepts to a simple structural problem (e.g., small bridge or roof frame); load analysis and design discussion.

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	3	12 hrs	10 hrs	0 hrs	0 hrs	2 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Autumn Semester - UE51

Continuum Mechanics [BSC_CONTMECH]

LEAD PROFESSOR(S): Vito RUBINO

Requirements

Statics, Dynamics, Mechanics of Deformable Bodies

Objectives

- Develop a unified approach to study solid and fluis mechanics
- Introduce formally the concepts of strains, stresses and constitutive equations
- Solve boundary value problems

Course contents

1) Notion of a continuous medium.
2) Introduction to tensor calculus. Link with linear algebra.
3) Kinematics of continuous media : Lagrangian and Eulerian descriptions. Introduction of strains in the linearized geometrical framework.
4) Introduction of the Cauchy stress tensor.
5) Balance laws : mass, linear and angular momentum.
6) Basic constitutive equations : linear elasticity, notion of isotropy, Newtonian fluids. Writing of Navier-Stokes equations.
7) Writing of a Boundary Value Problem, and solution of few linear problems. 3D beam in pure bending.
8) Lab: Identification of basic strain states via Digital Image Correlation on simple structures.

Course material

- Spencer A.J.M, Continuum Mechanics, Dover
- Lai, Rubin, Kempl, Introduction to continuum mechanics, BH

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	3	10 hrs	8 hrs	4 hrs	0 hrs	2 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Autumn Semester - UE52

Signal Processing [BSC_SIGPROC]

LEAD PROFESSOR(S): Maria SARKIS

Requirements

Maths and algorithmics, programming.

Objectives

Modern sensing and measurement devices in various engineering applications yield massive numerical data in various forms. Most of these sensors give data in structured forms such as signals and images. The key feature of any signal and image processing system is to retrieve the relevant information contained in such data.
The aim of this course is to:
§ Learn basics concepts and tools of signal and image processing, starting from data acquisition, communication and information retrieval
§ Address examples of data processing applications and system design in various domains: audio signal and biomedical engineering.

Course contents

Basics of signal processing:
§ Fundamentals of numerical signal acquisition and representation (CM : 4h, TP : 6h)
§ Audio signal processing (CM : 2h, TD : 4h)
§ Biomedical signal analysis (CM : 2h, TD : 4h)

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	3	8 hrs	8 hrs	6 hrs	0 hrs	2 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Autumn Semester - UE52

Finite Element Method [BSC_FEM]

LEAD PROFESSOR(S): Mathias LEGRAND

Requirements

Objectives

Understand the Basic Principle of The Finite Element Method.
Be able to code a finite-Element Software for Scalar field problems in static (1d, 2d trusses, 2d conduction).
Know how to use a Finite Element software to solve time-independent elliptic linear problem.

Course contents

I Introduction: Exemples of state of the art Finite Element Method Computation.
II One Dimensional Scalar Static Problem: From strong to Weak Form to discrete Problem Using Ritz Method .
III Limits of Ritz method, Spatial Discretization, Finite Element Space in 1D
IV Assembling and solving a Linear discrete problem: Truss system. .
V 2d Scalar problems (Thermal), Linear Elements
VI Plane Strain/Stress Elasticity Applications.
VII Practice: hands on Abaqus

Course material

A First Course In Finite Elements. Jacob Fish And Ted Belytschko, 2007
The Finite Element Method in Engineering, Singersu S. Rao, 2011

Assessment

Collective assessment: EVC 1 (coefficient 0.3)

Individual assessment: EVI 1 (coefficient 0.7)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	5	12 hrs	10 hrs	12 hrs	0 hrs	2 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Autumn Semester - UE52

Robotics [BSC_ROBOTICS]

LEAD PROFESSOR(S): Juan SANDOVAL AREVALO

Requirements

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Objectives

The aim of this course is to provide a general overview of robotics and to introduce the fundamentals of geometric and kinematic modeling of robot manipulators.

Course contents

The course combines theoretical lectures with tutorial sessions. Exercises are designed to reinforce the concepts through realistic case studies, using well-established robotics software tools such as CATIA and MATLAB.
The theoretical content covers:
- Introduction to robotics
- Geometric modeling of robot manipulators
- Kinematic modeling of robot manipulators
- Differential kinematics of robot manipulators

Course material

[1] Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, and Giuseppe Oriolo, Robotics: Modelling, planning and control, 1st ed., Springer Publishing Company, Incorporated, 2008.
[2] Siciliano, B. & Khatib, O. (eds.) (2008). Springer Handbook of Robotics. Berlin, Heidelberg: Springer. ISBN: 978-3-540-23957-4
[3] W Khalil and E Dombre, “Robot: Modeling, Identification and Control”, Butterworth-Heinemann 2004.

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	3	8 hrs	14 hrs	0 hrs	0 hrs	2 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Autumn Semester - UE53

Focus project 1 – Civil Engineering [BSC_FOCUS1_CENG]

LEAD PROFESSOR(S): Syed Yasir ALAM

Requirements

Base engineering and mathematics courses

Objectives

Put the students theoretical and organizational skills to use

Course contents

The students will work on a long term project along the year.
The project is aligned with the Focus topic, and managed by a leading professor.
The students organize their work and training meet the project's objectives.
If needed, the leading professor organize additional course sessions on selected topics.

The main objective of this first part is to discover the subject, define a workplan and start initial studies.

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	3	0 hrs	12 hrs	0 hrs	0 hrs	null hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Autumn Semester - UE53

Focus project 1 – Mechanical Engineering [BSC_FOCUS1_MENG]

LEAD PROFESSOR(S): Vincent MAHE

Requirements

Base engineering and mathematics courses

Objectives

Provide the students with theoretical and organisational skills

Course contents

The students will work on a long term project along the year.
The project is aligned with the Focus topic, and managed by a leading professor.
The students organize their work and training to meet the project's objectives.If needed, the leading professor organizes additional course sessions on selected topics.
The main objective of this first part is to discover the subject, define a workplan and start initial studies.

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	3	0 hrs	12 hrs	0 hrs	0 hrs	null hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Autumn Semester - UE53

Focus project 1 – Fluids & Energy [BSC_FLUIDNRJ]

LEAD PROFESSOR(S):

Requirements

Base engineering and mathematics courses

Objectives

Course contents

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	3	0 hrs	12 hrs	null hrs	0 hrs	0 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Autumn Semester - UE53

Focus project 1 – Signal, Control & Robotics [BSC_FOCUS1_SIGCORO]

LEAD PROFESSOR(S): Andrea CHERUBINI / Juan SANDOVAL AREVALO

Requirements

Base engineering and mathematics courses

Objectives

Put the students theoretical and organizational skills to use

Course contents

The students will work on a long term project along the year.
The project is aligned with the Focus topic, and managed by a leading professor.
The students organize their work and training meet the project's objectives.
If needed, the leading professor organize additional course sessions on selected topics.

The main objective of this first part is to discover the subject, define a workplan and start initial studies.

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	3	0 hrs	12 hrs	0 hrs	0 hrs	0 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Autumn Semester - UE54

FLE 5 - French as a foreign language [BSC_FLE5]

LEAD PROFESSOR(S): Silvia ERTL / Stéphanie MASSOT

Requirements

N/A

Objectives

The objective is to familiarize international students with the French language and culture through communicative tasks and by teaching situations focused on comprehension and oral practice. In addition, the acquisition of vocabulary, syntax and pronunciation completes the training in order to acquire the necessary knowledge to communicate in everyday situations but also to understand and follow the courses at the Ecole Centrale.
Students acquire general skills: specific communicative skills, language skills (knowledge of grammar, syntax and phonology) as well as social and cultural knowledge allowing them to use the appropriate vocabulary in communication situations. everyday life. Sociolinguistic and pragmatic skills are also required.

Course contents

Learners will be able to use the foreign language in a simple way for the following purposes:

Expressing views and opinions
Making a point
Agreeing/disagreeing
Delivering and structuring an idea
Argumenting and nuancing

Course material

We create our materials using authentics documents from press articles, television news, news magazines and the Internet. We also use digital tools such as Kahoot, Flipgrid or Padlet to boost our courses.

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	2	0 hrs	32 hrs	0 hrs	0 hrs	0 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Autumn Semester - UE54

LVC 5 - German [BSC_ALL5]

LEAD PROFESSOR(S): Katja BORCK

Requirements

Objectives

This course builds on the competences acquired in Years 1 and 2 and aims to consolidate and extend students' communicative abilities. It focuses on developing confidence and autonomy in using German in academic and professional contexts.

Course contents

The course provides practice in understanding and producing spoken and written German in familiar academic and professional situations. Students work on basic interaction and short written communication, with attention to clarity, accuracy, and independence.

Course material

Full range of practical communication language exercises: reading and listening comprehension, written expression and expression.

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
German	2	0 hrs	32 hrs	0 hrs	0 hrs	0 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Autumn Semester - UE54

LVC 5 - Spanish [BSC_ESP5]

LEAD PROFESSOR(S): Marta HERRERA

Requirements

Objectives

Can understand a wide range of demanding, longer texts, and recognise implicit meaning. Can express him/herself fluently and spontaneously without much obvious searching for expressions. Can use language flexibly and effectively for social, academic and professional purposes. Can produce clear, well-structured, detailed text on complex subjects, showing controlled use of organisational patterns, connectors and cohesive devices.

Course contents

- Presenting a company
- Preparing an application (CV, letter, interview)
- Grammatical content
- Prefixes and suffixes
- Complex comparative constructions (más de..., cuanto más...)
- Ser and estar
- Choice of past tenses
- Time markers. Organising discourse
- Subjunctive and conditional to express opinion, give advice, express wishes, feelings and moods
- Pronouns and relative adverbs
- Demonstratives and pronouns in certain constructions
- Choosing the present indicative or subjunctive

-Functional content :

- Physical description and personality
- Judging, evaluating
- Telling stories
- Correcting misinformation
- Defining
- Giving instructions
- Giving and asking for advice
- Advise
- Persuading, convincing
- Expressing agreement and disagreement
- Expressing doubts and reservations

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
Spanish	2	0 hrs	32 hrs	0 hrs	0 hrs	0 hrs

BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Autumn Semester - UE54

Business English 5 [BSC_BUSEN5]

LEAD PROFESSOR(S): Anna POLONYI

Requirements

Objectives

This course is designed to help engineering students enhance their English communication skills through the lens of social media. It integrates language development with digital communication competency using a blended learning approach. Students will explore the professional and personal use of social platforms, improve their digital presence, and learn to effectively share technical and personal content.

Course contents

By the end of the course, students will be able to: 1. Communicate effectively on various social media platforms. 2. Adjust tone and style based on audience and platform. 3. Simplify technical content for public understanding. 4. Enhance intercultural communication awareness. 5. Create and critique social media content for credibility, clarity, and tone. 6. Build a basic personal brand online.

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	1	0 hrs	32 hrs	0 hrs	0 hrs	0 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Autumn Semester - UE54

SHS5 [BSC_SHS5]

LEAD PROFESSOR(S): Julie BERGER

Requirements

None

Objectives

Understanding geopolitics and how power relations are exercised across territories.
Understanding the transnational challenges that are redefining contemporary geopolitics.

Course contents

- Understanding geopolitics: actors and issues
- The major powers and the global balance of power
- Resources, the economy, and globalization
- Global issues and challenges of the 21st century

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	-	0 hrs	16 hrs	0 hrs	0 hrs	0 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Autumn Semester - UE54

Pre-professionnal activities 5 [BSC_PREPRO5]

LEAD PROFESSOR(S): Grégory LEGRAIN

Requirements

Objectives

Raising student awareness of the business world through interactions with professionals

Course contents

- Company tours
- Professional days
- Company driven workshops
- Hackaton
- Startup challenge
- Ideation workshops
- Innovation workshops
- Industrial mentoring

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	1	0 hrs	24 hrs	0 hrs	0 hrs	0 hrs

This syllabus is not a legally binding document. Content is subject to change year on year.

BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - 3e année - 2e Semestre - UE61

Focus project 2 – Civil Engineering [BSC_FOCUS2_CENG]

Responsable(s) du cours : Syed Yasir ALAM

Pré-requis

Objectifs

Put the students theoretical and organizational skills to use

Plan de l'enseignement

The students will work on a long term project along the year.
The project is aligned with the Focus topic, and managed by a leading professor.
The students organize their work and training meet the project's objectives.
If needed, the leading professor organize additional course sessions on selected topics.

The main objective of this second part is to work full time on the project to meet the project's objectives.

Bibliographie

Évaluation

Évaluation individuelle : EVI 1 (coefficient 1)

LANGUE DU COURS	CRÉDITS ECTS	COURS MAGISTRAUX	TRAVAUX DIRIGÉS	TRAVAUX PRATIQUES	PROJET	DEVOIRS SURVEILLÉS
Anglais	12	0 hrs	60 hrs	0 hrs	0 hrs	null hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - 3e année - 2e Semestre - UE61

Focus project 2 – Signal, Control & Robotics [BSC_FOCUS2_SIGCORO]

Responsable(s) du cours : Andrea CHERUBINI / Juan SANDOVAL AREVALO

Pré-requis

Objectifs

Donner des notions de base sur les sujet suivants:
- traitement d'images et vision pour la robotique
- commande basée vision
- commande basée force pour l'interaction robotique
- robotics operating system (ROS)
- redondance robotique

Plan de l'enseignement

The students will work on a long term project along the year.
The project is aligned with the Focus topic, and managed by a leading professor.
The students organize their work and training meet the project's objectives.
If needed, the leading professor organize additional course sessions on selected topics.

The main objective of this second part is to work full time on the project to meet the project's objectives.

Bibliographie

Évaluation

Évaluation individuelle : EVI 1 (coefficient 1)

LANGUE DU COURS	CRÉDITS ECTS	COURS MAGISTRAUX	TRAVAUX DIRIGÉS	TRAVAUX PRATIQUES	PROJET	DEVOIRS SURVEILLÉS
Anglais	12	0 hrs	60 hrs	0 hrs	0 hrs	0 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - 3e année - 2e Semestre - UE61

Focus project 2 – Fluids & Energy [BSC_FLUIDNRJ]

Responsable(s) du cours :

Pré-requis

Base engineering and mathematics courses

Objectifs

Plan de l'enseignement

The students will work on a long term project along the year.
The project is aligned with the Focus topic, and managed by a leading professor.
The students organize their work and training meet the project's objectives.
If needed, the leading professor organize additional course sessions on selected topics.

The main objective of this second part is to work full time on the project to meet the project's objectives.

Bibliographie

Évaluation

Évaluation individuelle : EVI 1 (coefficient 1)

LANGUE DU COURS	CRÉDITS ECTS	COURS MAGISTRAUX	TRAVAUX DIRIGÉS	TRAVAUX PRATIQUES	PROJET	DEVOIRS SURVEILLÉS
Anglais	12	0 hrs	60 hrs	null hrs	0 hrs	0 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - 3e année - 2e Semestre - UE61

Focus project 2 – Mechanical Engineering [BSC_FOCUS2_MENG]

Responsable(s) du cours : Vincent MAHE

Pré-requis

Objectifs

Put the students theoretical and organizational skills to use

Plan de l'enseignement

The students will work on a long term project along the year.
The project is aligned with the Focus topic, and managed by a leading professor.
The students organize their work and training meet the project's objectives.
If needed, the leading professor organize additional course sessions on selected topics.

The main objective of this second part is to work full time on the project to meet the project's objectives.

Bibliographie

Évaluation

Évaluation individuelle : EVI 1 (coefficient 1)

LANGUE DU COURS	CRÉDITS ECTS	COURS MAGISTRAUX	TRAVAUX DIRIGÉS	TRAVAUX PRATIQUES	PROJET	DEVOIRS SURVEILLÉS
Anglais	12	0 hrs	60 hrs	0 hrs	0 hrs	null hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Spring Semester - UE62

Research Methodology and Practice [BSC_RESEARCH]

LEAD PROFESSOR(S): Grégory LEGRAIN

Requirements

Objectives

Discover research

Course contents

- organization of research
- bibliography
- writing a scientific document
- participation in research activities

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	3	10 hrs	14 hrs	0 hrs	0 hrs	0 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Spring Semester - UE63

FLE 6 - French as a foreign language [BSC_FLE6]

LEAD PROFESSOR(S): Silvia ERTL / Stéphanie MASSOT

Requirements

N/A

Objectives

The objective is to familiarize international students with the French language and culture through communicative tasks and by teaching situations focused on comprehension and oral practice. In addition, the acquisition of vocabulary, syntax and pronunciation completes the training in order to acquire the necessary knowledge to communicate in everyday situations but also to understand and follow the courses at the Ecole Centrale.
Students acquire general skills: specific communicative skills, language skills (knowledge of grammar, syntax and phonology) as well as social and cultural knowledge allowing them to use the appropriate vocabulary in communication situations. everyday life. Sociolinguistic and pragmatic skills are also required.

Course contents

This last semester (12h00) is focused on a civilizational and intercultural retrospective after 3 years spent in France.

Learners will have to choose written or spoken tasks among a list in order to improve their written and oral expression skills.
Teacher led project work

Course material

We create our materials using authentic documents from press articles, television news, news magazines and the Internet.
We also use digital tools such as Kahoot, Flipgrid or Padlet to boost our courses.

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	1	0 hrs	12 hrs	0 hrs	0 hrs	0 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Spring Semester - UE63

LVC 6 - German [BSC_ALL6]

LEAD PROFESSOR(S): Katja BORCK

Requirements

Objectives

This course builds on the competences acquired in Years 1 and 2 and aims to consolidate and extend students' communicative abilities. It focuses on developing confidence and autonomy in using German in academic and professional contexts.

Course contents

The course provides practice in understanding and producing spoken and written German in familiar academic and professional situations. Students work on basic interaction and short written communication, with attention to clarity, accuracy, and independence.

Course material

Full range of practical communication language exercises: reading and listening comprehension, written expression and expression.

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
German	1	0 hrs	12 hrs	0 hrs	0 hrs	0 hrs

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BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Spring Semester - UE63

LVC 6 - Spanish [BSC_ESP6]

LEAD PROFESSOR(S): Marta HERRERA

Requirements

Objectives

Can understand a wide range of demanding, longer texts, and recognise implicit meaning. Can express him/herself fluently and spontaneously without much obvious searching for expressions. Can use language flexibly and effectively for social, academic and professional purposes. Can produce clear, well-structured, detailed text on complex subjects, showing controlled use of organisational patterns, connectors and cohesive devices.

Course contents

- Presenting a company
- Preparing an application (CV, letter, interview)
- Grammatical content
- Prefixes and suffixes
- Complex comparative constructions (más de..., cuanto más...)
- Ser and estar
- Choice of past tenses
- Time markers. Organising discourse
- Subjunctive and conditional to express opinion, give advice, express wishes, feelings and moods
- Pronouns and relative adverbs
- Demonstratives and pronouns in certain constructions
- Choosing the present indicative or subjunctive

-Functional content :

- Physical description and personality
- Judging, evaluating
- Telling stories
- Correcting misinformation
- Defining
- Giving instructions
- Giving and asking for advice
- Advise
- Persuading, convincing
- Expressing agreement and disagreement
- Expressing doubts and reservations

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
Spanish	1	0 hrs	12 hrs	0 hrs	0 hrs	0 hrs

BACHELOR OF SCIENCE IN ENGINEERING

2025/2026 - Year 3 - Spring Semester - UE64

Bachelor Final Internship [BSC_BSCTHESIS]

LEAD PROFESSOR(S): Grégory LEGRAIN

Requirements

Objectives

This course is completed at the end of the third year. The student will carry a project in a company as an engineer assistant.

Course contents

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
English	14	0 hrs	0 hrs	0 hrs	0 hrs	0 hrs

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