This public handbook contains the harmonised descriptions of all Civil Engineering modules. Module titles, Teaching Units, ECTS credits, workload and assessment terminology are controlled against Appendix 4. Where an earlier academic amendment date was documented in the source handbook, it is retained; where none was documented, this is stated transparently. All module descriptions underwent academic and editorial review on 23 August 2026. Corrections are documented in the institutional validation record.

ESSAT
Ecole Supérieure Des Sciences Appliquées et de la Technologie Privée de Gabès

ESSAT PRIVATE HIGHER SCHOOL OF APPLIED SCIENCES AND TECHNOLOGY OF GABÈS

ENGINEERING DIPLOMA IN CIVIL ENGINEERING

APPENDIX 5 – MODULE HANDBOOK

Academic Year 2024–2025 | Current academic review and harmonisation: 23 August 2026

Workload reference: 1 ECTS = 25 hours of total student workload

Public version: personal direct contact details are omitted; module coordinators remain accessible through ESSAT institutional channels.

Approved by: Mr Abdallah Zrelli, Director of ESSAT

Signature and institutional stamp:

Document Control and Use

Document reference	GES-IMP-34 - Appendix 5
Index	03
Programme	Civil Engineering / Génie Civil
Degree	Engineering Diploma in Civil Engineering / Diplôme d'Ingénieur en Génie Civil
Programme duration	Six semesters - 180 ECTS - EQF Level 7
Academic version	2024–2025
Handbook review/harmonisation	23 August 2026

Harmonisation principles

- Appendix 4 is the canonical source for module titles, semesters, ECTS credits and workload values.
- The handbook uses the term Module consistently and distinguishes structured learning/activity from independent work.
- Teaching and learning methods are stated explicitly from the activities described in the legacy syllabi and the programme-wide methods confirmed during the ASIIN audit.
- Where the source handbook did not document an earlier academic amendment date, the field states "No earlier amendment date documented"; every module underwent current academic review on 23 August 2026.
- Blank source fields are not invented. Missing information is stated transparently or represented through an institutional contact route in the public version.
- Detailed CLO-PLO relationships remain governed by the official CLO-PLO mapping matrix.

Workload convention

1 ECTS corresponds to 25 hours of total student workload. The planning reference is 15 hours of structured learning/activity and 10 hours of independent work. The internal distribution may vary by module type, while the total workload remains consistent with the ECTS allocation and is verified through the student workload monitoring procedure.

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Mathematics I

Semester / TU	**S1 | T.U.01 - Fundamental Sciences for Engineers I**	**Module coordinator**	**Hajer Taouil**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module develops advanced mathematical tools used in engineering, including multiple integrals, changes of variables, Fourier transforms and series, and Gamma and Beta functions.

Module learning outcomes	Indicative content
• Evaluate double and triple integrals and apply changes of variables. • Use Gamma and Beta functions in integral calculations. • Determine Fourier transforms and Fourier series of selected functions. • Apply these mathematical tools to engineering problems.	• Double and triple Integrals • Fourier transform • Series of Fourier • Euleriennes Functions

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Guided exercises and application problems on multiple integrals, Fourier analysis and Eulerian functions are integrated into directed-work sessions; no separate laboratory session is required.	Midterm examination: 30%; Problem sets (individual/group coursework): 10%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Double integral, transformation of Fourier, Fourier series and Euleriennes functions.	Calcul différentiel, intégrales multiples, séries de Fourier · Volume 2 Par François Cottet-Emard · 2006

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Computer Science I

Semester / TU	**S1 | T.U.01 - Fundamental Sciences for Engineers I**	**Module coordinator**	**Anouar Ben Abdennour**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module introduces the fundamentals of C programming for beginners. It covers variables, data types, operators, control structures, functions, arrays, strings, elementary algorithms and debugging, enabling students to write and test functional programs.

Module learning outcomes	Indicative content
• Understand and apply basic programming concepts such as variables, data types, operators, and control structures in C. • Write and debug simple C programs, demonstrating knowledge of syntax, logic, and basic input/output operations. • Implement control structures (if-else statements, loops) to solve problems and control the flow of a C program. • Define and use functions to structure programs, pass arguments, and return values. • Work with arrays and strings, performing common operations like initialization, sorting, and searching. • Use debugging techniques to identify and fix errors in C programs.	• Introduction to C programming and the development environment. • Variables, data types, operators and basic input/output. • Conditional statements, loops and switch structures. • Functions, arguments, return values and variable scope. • Arrays, strings, elementary searching and sorting. • Debugging techniques and an integrated programming application.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Laboratory/practical or application-based learning.	Lab 1: development environment and first C program; Lab 2: variables, data types and arithmetic; Lab 3: conditionals, loops and switch statements; Lab 4: functions and modular programming; Lab 5: arrays and strings; Lab 6: debugging techniques; Lab 7: integrated calculator application.	Attendance and participation: 5%; Lab+ Midterm examination: 35%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
This module does not require any prerequisites.	Kernighan, B.W., & Ritchie, D.M. (1988).; The C Programming Language (2nd ed.).; Prentice Hall. Balagurusamy, E. (2017).

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Numerical Analysis

Semester / TU	**S1 | T.U.01 - Fundamental Sciences for Engineers I**	**Module coordinator**	**Hanen Najjar**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module introduces numerical methods for computing exact or approximate solutions of equations and systems, with emphasis on matrix methods, conditioning, direct and iterative algorithms, and MATLAB implementation.

Module learning outcomes	Indicative content
• Distinguish direct and iterative methods for solving linear systems. • Analyse conditioning, convergence and numerical error. • Implement Gauss, LU, Cholesky, Jacobi and Gauss-Seidel methods in MATLAB. • Verify and interpret numerical results for engineering applications.	Numerical solution of equations and systems; matrix methods and conditioning; direct methods (Gauss, LU and Cholesky); iterative methods (Jacobi and Gauss-Seidel); MATLAB implementation; verification of numerical results through practical applications.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Laboratory/practical or application-based learning; Software-supported learning.	The lab component of this module will provide MATLAB exercises to develop applications that will cover different aspects of this module.; The required software is MATLAB.	Midterm examination: 20%; Final examination: 60%; Laboratory work: 20%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Linear algebra and matrix calculus	P. Lascaux and R. Théodor, Analyse numérique matricielle appliquée à l'art de l'ingénieur, Vols. 1–2, Masson, 1986; G. Allaire and S. M. Kaber, Algèbre linéaire numérique, Ellipses, 2002; M. Crouzeix and A. L. Mignot, Analyse numérique des équations différentielles, Masson, 1984.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Solid Mechanics

Semester / TU	**S1 | T.U.02 - Fundamentals of Mechanics and Materials**	**Module coordinator**	**Ahlem Sdiri**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

Solid mechanics is a branch of mechanics that aims to study motions, deformations, and stress fields within continuous media (solids or fluids). This field, often considered the quintessential engineering science, allows us to understand and describe the material world around us and the common phenomena occurring within it. It is based on the universal laws of classical mechanics, known as conservation laws (mass, momentum, angular momentum, and energy), combined with information about the intrinsic properties of the medium under study, provided by constitutive equations such as Hooke's law in elasticity.

Module learning outcomes	Indicative content
• To provide students in the field with the necessary elements to approach solid mechanics problems. • To support and contribute to the teaching of this discipline by offering students a rigorous and practical resource. • To introduce students to this discipline, its capabilities, and its limitations, allowing them to broaden their knowledge in the field.	Kinematics of continuous media; conservation of mass and momentum; stress tensor and principal stresses; strain tensor and deformation measures; constitutive behaviour; linear elasticity and the generalized Hooke law.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Tensor-calculation exercises and worked applications on kinematics, stresses, strains and elasticity are integrated into directed-work sessions.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Engineering Mathematics - General Mechanics	E.J. Hearn, Mechanics of Materials 1, 3rd ed.; E.J. Hearn, Mechanics of Materials 2, 3rd ed.; S. Timoshenko and J.N. Goodier, Theory of Elasticity, McGraw-Hill, 1951; S. Forest and M. Amestoy, Continuum Mechanics, Ecole des Mines de Paris, 2010.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Construction Materials

Semester / TU	**S1 | T.U.02 - Fundamentals of Mechanics and Materials**	**Module coordinator**	**Najeh Graja**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module provides an overview of the different types of construction materials, including aggregates, binders, and additives. For each, we will detail their origin, manufacturing processes, types, and characteristics. A significant portion of the module will focus on concrete formulation using the Dreux-Gorisse method.

Module learning outcomes	Indicative content
• Define construction materials and their importance in the field of civil engineering. • Classify materials based on various criteria. • Present the main properties of materials. • Emphasize the importance of standards and testing in the selection and use of materials.	• Properties and Characteristics of Construction Materials • Aggregates • Mineral Binders • Hydraulic Concrete and Concrete Formulation

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Laboratory/practical or application-based learning.	Physical properties of construction materials: bulk and absolute density, particle-size analysis by sieving and sand-equivalent test. Mechanical properties of aggregates: Micro-Deval and Los Angeles tests. Binder characterization: consistency, setting and hardening times, and binder classification.	Laboratory work: 20%; Attendance and participation + Midterm examination: 20%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Mathematics: To perform the necessary calculations to determine the physical parameters of construction materials and verify their strength. Physics: To understand the behavior of materials. Chemistry: To understand the composition of materials and the chemical reactions involved in their production and use.	Neville: Properties of Concrete; Eyrolles, 2000.; Baron and J.P.; Ollivier: Concrete: Basics and Data for Their Formulation; Eyrolles, 1997.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Tutored Project 1-1

Semester / TU	**S1 | T.U.02 - Fundamentals of Mechanics and Materials**	**Module coordinator**	**Najeh Graja**
Nature / delivery	Fundamental | Non-presential	**Frequency / duration**	Annually | One semester
ECTS / workload	1 ECTS | 25 h total (15 h structured + 10 h independent)	**Assessment mode**	Project-based assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This tutorial project will involve studying the mechanical behavior of a concrete structural element (e.g., a beam, column, slab). Students will: Define a specific case study with defined loads and boundary conditions. Analyze the element using Solid Mechanics principles (calculating stresses, strains, etc.). Characterize the constituent materials, especially concrete, using knowledge from the Construction Materials module (concrete mix design, mechanical properties). Compare theoretical results with experimental or numerical results (if feasible). Evaluate the influence of variations in material properties on the element's behavior.

Module learning outcomes	Indicative content
• Apply the principles of Solid Mechanics to analyze the behavior of a structural element. • Understand the influence of construction material properties, particularly concrete, on the element's performance. • Develop skills in modeling, calculation, and interpretation of results. • Develop teamwork, project management, and communication skills.	• Case Study Definition and Literature Review • Theoretical Calculations • Material Characterization • Comparative Analysis • Parametric Study • Report and Presentation

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation; Case-study analysis.	Supervised project work leading to documented technical deliverables.; Written report and/or oral presentation, as specified in the module brief.	Quality and relevance of theoretical calculations: 40%; Quality of material characterization and application of the Dreux-Gorisse method: 30%; Quality of the comparative analysis and parametric study: 20%; Teamwork and participation: 10%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
No formal prerequisite.	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Engineering Geology and Geophysics

Semester / TU	**S1 | T.U.03 - Geoenvironmental Engineering and Fluid Mechanics**	**Module coordinator**	**Najeh Graja**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module is designed to equip first-year civil engineering students with a foundational understanding of geology and geophysics as applied to construction projects. Specifically, it will delve into the properties of soils and rocks, their mechanical response, and how these materials interact with civil engineering structures.

Module learning outcomes	Indicative content
• Recognize the structure of the Globe and the Earth's crust. • Recognize the different minerals and rocks. • Understand the principle of the different geophysical methods. • Define the parameters measured and calculated by each method. • Choose the appropriate geophysical prospecting method. • Understand the importance of geology and geophysics in the field of civil engineering.	• Introduction to Engineering Geology • Structure of the Earth • Major Structural Units of the Earth's Crust • Minerals • Rocks • Geological Structures • Geological Maps and Cross-Sections

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Map-reading, geological-section and geophysical-method exercises are integrated into tutorials; no separate laboratory session is scheduled.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Basic Sciences : Mathematics ; Physics ; Chemistry Earth Sciences: Introductory Geology ; Introductory Geophysics	Goguel J., Application of geology to engineering works.; Edition Masson, Paris, 1976. Dercourt J., Paquet J., Geology: objects and methods.; 7th edition.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Hydrology

Semester / TU	**S1 | T.U.03 - Geoenvironmental Engineering and Fluid Mechanics**	**Module coordinator**	**Ahmed Mansri**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module introduces students to the fundamental principles of hydrology and hydraulics, with a particular emphasis on applications in civil engineering. It covers the hydrological cycle, watershed analysis, precipitation studies, and methods for calculating flood discharge. An introduction to bridge hydraulics is also included, providing the foundational knowledge required for the design and protection of such structures against hydrological risks.

Module learning outcomes	Indicative content
• Understand and describe the hydrological cycle. Characterize and analyze watersheds. • Analyze rainfall data and precipitation formation processes. Calculate flood discharge using various methods. • Understand the basic principles of bridge hydraulics and their interaction with watercourses. • Apply the knowledge gained to real-world civil engineering problems.	• Hydrological Cycle • Watershed Analysis • Precipitation and Rainfall Analysis • Flood Discharge Calculation • Bridge Hydraulics

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Software-supported learning.	Watershed analysis, rainfall statistics, hydrograph interpretation and flood-discharge calculations are integrated into tutorial sessions; GIS-supported demonstrations may be used where appropriate.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
No formal prerequisite.	REMENIERAS G., 1965, Hydrology for Engineers, 2nd Edition, Eyrolles, Paris.; ROCHE M., 1963, Surface Hydrology, Gauthier-Villars, Paris.; CASTANY G., 1982, Principles and Methods of Hydrogeology, Dunod Université.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Fluid Mechanics

Semester / TU	**S1 | T.U.03 - Geoenvironmental Engineering and Fluid Mechanics**	**Module coordinator**	**Nihed Kilani**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

4 chapters, structured as follows: 1. Introduction to fluid medium: Fluid and fluid particle, body forces, surface forces, pressure, compressible and incompressible fluids, ideal fluid. 2. Statics of Fluids: Fundamental equation of fluid statics, hydrostatics and applications, compressible fluids, Archimedes' principle and applications. 3. Dynamics of ideal fluids: Euler's equation, boundary conditions, Bernoulli's theorem and applications, Pitot and Venturi tubes. 4. Dynamics of real fluids.

Module learning outcomes	Indicative content
- Identify and characterize ideal, real, incompressible and compressible fluids. - Apply hydrostatic relations, Pascal's principle and pressure-force calculations, including centre of pressure and buoyancy. - Apply continuity, mass-flow and volumetric-flow relations. - Apply Bernoulli and Euler theorems to ideal and real-fluid problems. - Determine Reynolds number and distinguish laminar and turbulent regimes. - Calculate linear and singular head losses and use generalized Bernoulli relations in engineering applications.	1. Fluid medium and physical properties. 2. Fluid statics and hydrostatic applications, including Archimedes' principle. 3. Dynamics of ideal fluids: Euler equation, boundary conditions, Bernoulli theorem, Pitot and Venturi tubes. 4. Dynamics of real fluids and head-loss calculations.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Hydrostatics, Bernoulli, flow-regime and head-loss calculations are integrated into tutorials and demonstrations; no separate laboratory session is scheduled.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
This module is based on the general knowledge of physics and mathematics acquired during the preparatory cycle.	P. Chassaing, Fluid Mechanics; R. Joulé, Applied Fluid Mechanics, Ellipses, 1998; ENIT, Cours de mécanique des fluides (institutional online resource).

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Computer-Aided Building Drawing (CABD)

Semester / TU	**S1 | T.U.04 - CAD and Instrumentation**	**Module coordinator**	**Snoussi Hichem**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Continuous assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module introduces students to technical drawing techniques and computer-aided design (CAD) using AutoCAD software. It covers the basics of 2D drawing, modification tools, layer management, dimensioning, layout, and printing. Depending on the level, the module may also cover 3D modeling, dynamic block creation, and other advanced features. The goal is to enable students to create precise and professional building plans.

Module learning outcomes	Indicative content
• Adapt to the use of computer-aided design (CAD) tools.	• Introduction to AutoCAD • Modification Tools and Drawing • Dimensioning and Annotations • Layout and Printing

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Laboratory/practical or application-based learning; Software-supported learning.	Building drawing: facades, plans, sections and details. Reinforced-concrete drawing: formwork, reinforcement, footings, columns and beams, precast-slab floors and reinforced-concrete walls, using AutoCAD.	Continuous Assessment: 100%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Basic Computing	Renaud H.: Technical Drawing/Plan Reading (Building and Reinforced Concrete), Foucher Edition.; Tourpé A.: Computer-Aided Design (CAD) in the Training of Engineers.; An alternation between the technical drawing workshop (drawing with instruments) and the CAD workshop (drawing on computer) using the AutoCAD software.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Tutored Project 1-2

Semester / TU	**S1 | T.U.04 - CAD and Instrumentation**	**Module coordinator**	**Snoussi Hichem**
Nature / delivery	Fundamental | Non-presential	**Frequency / duration**	Annually | One semester
ECTS / workload	1 ECTS | 25 h total (15 h structured + 10 h independent)	**Assessment mode**	Project-based assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This project combines CAD skills with Solid Mechanics principles. Students will create detailed CAD drawings of structural elements (e.g., beams, trusses, frames) and then use these drawings as a basis for structural analysis calculations. The project could also involve visualizing stress distributions or deformations on the CAD models.

Module learning outcomes	Indicative content
• Develop proficiency in using AutoCAD for creating accurate 2D and potentially 3D representations of structural elements. • Apply principles of Solid Mechanics to analyze structural behavior. • Integrate CAD models with structural analysis concepts. • Develop skills in technical communication and presentation.	• Project Definition and Material Selection • CAD Drawing Creation • Detailing and Annotation • Report and Presentation

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation; Software-supported learning.	Supervised project work leading to documented technical deliverables.; Written report and/or oral presentation, as specified in the module brief.	Accuracy and completeness of the CAD drawings: 50%; Correct representation of materials and detailing: 30%; Quality of the report and presentation: 20%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
No formal prerequisite.	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Measurement and Instrumentation

Semester / TU	**S1 | T.U.04 - CAD and Instrumentation**	**Module coordinator**	**Nihed Kilani**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module comprises four areas: introduction to metrology, metrological characteristics, performance of measurement systems, and temperature measurement. It develops the ability to select instruments, quantify uncertainty and interpret calibration and measurement results.

Module learning outcomes	Indicative content
- Identify sources of measurement error and uncertainty. - Apply principles of dimensional and geometric metrology. - Select and use appropriate measuring instruments for a given verification task. - Perform and interpret repeatability and reproducibility studies. - Explain calibration principles and interpret dimensional and geometric tolerances. - Produce a measurement report and solve industrially oriented measurement problems.	Introduction to metrology; metrological characteristics; performance of measurement systems; measurement errors and uncertainty; calibration, repeatability and reproducibility; temperature measurement and thermocouples.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Case-study analysis.	Exercises on measurement errors, uncertainty, calibration, regression, repeatability and sensor characteristics are integrated into directed-work sessions.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
This module is based on the general knowledge of physics and mathematics acquired during the preparatory cycle.	Metrology and Measuring Instruments, Frija Mounir, Higher Institute of Applied Sciences and Technology of Sousse.; Practical guide to precision measuring instruments.; Temperature measurements, 2006-2007.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Initiation and Introduction to Economics

Semester / TU	**S1 | T.U.05 - Human Sciences and Engineering Culture I**	**Module coordinator**	**Jihene Jaouadi**
Nature / delivery	Transversal | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

It is necessary for this module to know the basic notions of economics (definitions, the economic circuit, the different schools of economic thought). As well as, knowledge of the significance of economic agents (calculation of employment and resources, economic balance), the various economic aggregates and being able to distinguish and calculate them (calculation of production, PNB, PIB, unemployment rate, value added). Finally, this module will be completed by presenting the determinants of the market (supply function, demand function, market equilibrium).

Module learning outcomes	Indicative content
• Identify basic economic concepts. • Calculation of economic equilibrium: uses and resources and their significance • Calculation of production aggregates: PNB , PIB , value added . • Determining market equilibrium: supply/demand: market equilibrium	• Basic Economic Concepts and Schools of Thought • Economic Agents and the Economic Circuit • Production and Distribution Mechanisms • Economic Aggregates • Market Mechanisms and Equilibrium

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	In the application exercises, we try to apply the formulas for explaining use and resources.; calculation of production aggregates and interpretation of the results obtained.; Determination of supply and demand functions, market equilibrium, using appropriate calculation methods.	Supervised assessment and participation: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
-Economics : basic concepts, fundamental elements, the different currents of economic thought market,market balance ,production (mesure) - economics agent	J.F. Dhenin et al., Economie generale, Breal, 2000; I. Abdeljaoued, L. Bouzaiane and A. Bsais, Introduction a l'economie, CPU, 1999; A. Sassi Tmar, Introduction a l'economie generale contemporaine, 2013; A. Buridant et al., Histoire des faits economiques et problemes economiques contemporains, Breal, 2001.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Technical Communication

Semester / TU	**S1 | T.U.05 - Human Sciences and Engineering Culture I**	**Module coordinator**	**Jihene Jaouadi**
Nature / delivery	Transversal | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

It is necessary for this module to know the concepts and techniques of oral expression (exercise of application); as well as the non-verbal expression (concept, technique), and to ensure the comparison between: oral and non-oral expression and finally the means to manage the stage fright and the elaboration of the CV.

Module learning outcomes	Indicative content
• Discuss and Define oral expression this is reinforced by an application exercise. • The different techniques of oral expression this is reinforced by an application exercise • Define and explain non-verbal communication and distinguish between verbal and non-verbal communication • In this chapter, we look at how to deal with stage fright, taking into account the following examples • How to build a CV, applying knowledge to students' personal CVs.	• Explain what oral expression • Explaining oral expression • non-verbal communication Comparing and distinguishing between verbal and non-verbal • stress management Techniques for overcoming • Steps to building a CV

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Interactive language practice and presentations.	Student projects on communication techniques selected by the instructor, with an assigned presentation date. Activities include preparation, oral presentation, discussion and feedback.	Supervised assessment: 30%; Project work + participation: 10%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
-Developing a CV -Oral expression and techniques -Oral expression, non-verbal and techniques, -stage fright,	1-Jean Marc Defays,2003, Principes et pratiques de la communication scientifique et technique , deBoeck 2-Philippe Morel , 2015, Communication d'entreprise , Studyrama

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

English I

Semester / TU	**S1 | T.U.05 - Human Sciences and Engineering Culture I**	**Module coordinator**	**Rabeb Hamrouni**
Nature / delivery	Transversal | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

• This module is meant to be an introduction to Civil Engineering course. It provides clear description of the different equipment, structures, and methods used in construction. • In addition, it serves as basic step towards B2 grammar.

Module learning outcomes	Indicative content
• Use core civil-engineering vocabulary for equipment, construction methods, foundations and building components. • Apply basic grammar structures accurately in technical contexts. • Read and understand short technical texts. • Prepare and deliver short oral presentations on civil-engineering topics.	• Civil-engineering tools, equipment and machinery. • Construction methods, foundations, building materials and components. • Basic technical vocabulary for building design. • Personal pronouns, present simple and present progressive. • Short technical research tasks and oral presentations.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Interactive language practice and presentations.	Technical-vocabulary, grammar, reading, speaking and short-presentation activities are integrated into class sessions.	Continuous assessment and coursework: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Students should have enough knowledge of General English language. They also need to be familiar with basic civil engineering vocabulary in the French language.	Cambridge English for engineering.

Language of instruction: English | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Mathematics II

Semester / TU	**S2 | T.U.06 - Fundamental Sciences for Engineers II**	**Module coordinator**	**Hajer Taouil**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

- learn how to calculate an integral with Laplace transformation. -Resolve a differential equation with Laplace transformation. - Calculate a distribution. -Resolve partial differential equations

Module learning outcomes	Indicative content
• Resolve successfully a partial differential equations. • Define transformation of Laplace of some functions.	• Laplace transform • Distribution • Partial differential Equation

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Guided exercises on Laplace transforms, distributions and partial differential equations are integrated into directed-work sessions.	Midterm examination: 20%; Problem sets (individual/group coursework): 10%; Laboratory work: 10%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
transformation of Laplace, Distributions and partial differential equations.	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Computer Science II

Semester / TU	**S2 | T.U.06 - Fundamental Sciences for Engineers II**	**Module coordinator**	**Anouar Ben Abdennour**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module introduces civil engineering students to Python programming. It focuses on using Python to solve civil engineering problems such as data analysis, structural analysis, numerical modeling, and simulations. The course covers key Python concepts and their application to engineering tasks such as material properties, load analysis, and water distribution systems.

Module learning outcomes	Indicative content
• Understand Python Fundamentals: Demonstrate proficiency in Python programming, including variables, data types, functions, loops, and control structures. • Apply Python to Engineering Problems: Use Python to solve civil engineering problems, such as structural analysis, material behavior, and fluid dynamics. • Analyze and Visualize Data: Use Python libraries like NumPy, Pandas, and Matplotlib to analyze, manipulate, and visualize engineering data. • Implement Numerical Methods: Apply numerical methods (e.g., solving equations, numerical integration) in Python to solve engineering calculations. • Model Civil Engineering Systems: Develop Python programs to model and simulate real-world civil engineering systems, such as load distributions and water flow. • Work with Engineering Data: Efficiently handle large datasets, read from and write to files, and process data for engineering applications.	Python fundamentals and engineering applications; variables, data types, control structures and functions; data structures; NumPy arrays and matrix operations; Matplotlib visualization; file handling; numerical methods; civil-engineering data analysis, structural calculations and simulations.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Laboratory/practical or application-based learning; Software-supported learning.	Programming Exercises: Writing Python programs for civil engineering calculations.; Data Analysis: Using Python to analyze and visualize engineering data.; Engineering Simulations: Simulating civil engineering problems (e.g., beam bending, fluid flow).; Project Development: Working on individual/group projects using Python for complex simulations.; Debugging and Optimization: Debugging code and optimizing for better performance.	Attendance and participation: 5%; Laboratory work and supervised assessment: 35%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
This module does not require any prerequisites.	Laskowski, E.; Python for Civil Engineers.; XYZ Publishers.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Numerical Analysis Project

Semester / TU	**S2 | T.U.06 - Fundamental Sciences for Engineers II**	**Module coordinator**	**Hanen Najjar**
Nature / delivery	Fundamental | Non-presential	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Project-based assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

Students work in pairs to define a numerical-analysis project, conduct a bibliographic review, formulate the problem, implement appropriate numerical methods computationally, validate the code through applications, focus on civil-engineering use cases, and present the results in a written report and oral presentation.

Module learning outcomes	Indicative content
- Deepen Numerical Analysis knowledge through project-based application. - Formulate a numerical problem and select appropriate numerical methods. - Implement numerical algorithms computationally and document the code. - Verify and validate numerical results through test cases and engineering applications. - Interpret results and communicate the methodology and conclusions in a written report and oral presentation.	Project definition and bibliographic review; numerical problem formulation; computational implementation; code verification and validation; civil-engineering application; interpretation of results; written report and oral presentation.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation.	Supervised computational project, normally completed in pairs, using appropriate numerical-analysis and programming/software tools. Deliverables include validated code, engineering application, report and oral presentation.	Problem formulation and theoretical/numerical methodology: 25%; Numerical implementation and code quality: 30%; Verification, validation and interpretation of results: 25%; Civil-engineering application, report and oral presentation: 20%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Successful completion of Numerical Analysis.	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Probability and Statistics

Semester / TU	**S2 | T.U.06 - Fundamental Sciences for Engineers II**	**Module coordinator**	**Hanen Najjar**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

Statistical methods are widely used in almost all areas of human activity: science and technology, economics, humanities and social sciences. They form part of an engineer's basic knowledge. Their countless industrial applications include quality control, reliability, analysis of measurement results, forecasting and planning. The proposed course is designed to provide an introduction to the usual statistical methods and reasoning useful to engineers.

Module learning outcomes	Indicative content
• Apply combinatorial methods and probability axioms. • Compute conditional probabilities and assess independence. • Model discrete and continuous random variables and determine their moments. • Work with joint, marginal and conditional distributions and correlation. • Select and interpret standard probability distributions in engineering applications.	• Combinatorics and elementary set theory. • Probability axioms, conditional probability and independence. • Discrete and continuous random variables and distribution functions. • Expectation, variance, moments and correlation. • Joint, marginal and conditional distributions. • Standard discrete laws, the normal distribution and other continuous laws.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Problem sets on probability laws, random variables, distributions and statistical interpretation are integrated into tutorial sessions.	Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
knowledge of probability and mathematical concepts.	[1] Sheldon M.; Ross, Initiation aux probabilités.; Presses polytechniques romandes, Lausanne, 1987. [2] Jim Pitman, Probability.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Strength of Materials

Semester / TU	**S2 | T.U.07 - Fundamental Principles of Civil Engineering**	**Module coordinator**	**Ahlem Sdiri**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	4 ECTS | 100 h total (60 h structured + 40 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module aims to provide students with the fundamental principles of Strength of Materials, focusing on the analysis of simple and combined stresses in beams. It covers the concepts of stresses, strains, geometric properties of sections, the calculation of internal forces, and the study of buckling.

Module learning outcomes	Indicative content
• Calculate the geometric properties of planar sections. • Master the mechanical concepts required for Strength of Materials. • Determine the internal forces in a beam. • Analyze stresses and deformations caused by simple loads (tension/compression, simple bending). • Analyze stresses and deformations caused by combined bending. • Understand the phenomenon of buckling and calculate the critical load of a beam..	• Geometric Properties of Plane Sections • Mechanics and Stress-Strain Review • Internal Forces in Beams • Simple Tension and Compression • Simple Bending • Combined Bending and Buckling

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Laboratory/practical or application-based learning.	The lab sessions will allow for the experimental application of the concepts covered in the module.; Determination of internal forces in beams subjected to various loads.; Calculation of stresses and deformations in tension/compression and simple bending.	Laboratory work: 20%; Attendance and participation + Midterm examination: 20%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Continuum Mechanics	Understand the Basics of Strength of Materials.; Practical Structural Calculations (Wolfgang A.; JALIL), EYROLLES Edition.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Soil Mechanics I

Semester / TU	**S2 | T.U.07 - Fundamental Principles of Civil Engineering**	**Module coordinator**	**Nessrine Essid**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This introductory module familiarises students with the physical and mechanical properties of soils, their hydraulic behaviour, stress distribution and consolidation, with emphasis on practical civil-engineering applications.

Module learning outcomes	Indicative content
• Acquire fundamental knowledge about soil properties • Calculate stresses in soil • Estimate soil settlements following changes in stress states.	Physical properties and classification of soils; phase relationships; compaction and Proctor testing; permeability and Darcy law; geostatic and additional stresses; consolidation theory; settlement calculation and engineering applications.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Laboratory/practical or application-based learning.	The lab sessions will allow for the experimental application of the concepts covered in the module.; Atterberg Limits; Proctor Test; Permeability Tests	Laboratory work: 20%; Attendance and participation + Midterm examination: 20%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Solid Mechanics Fluid Mechanics	Schlosser F.: Elements of Soil Mechanics.; Course of the École Nationale des Ponts et Chaussées – ENPC Press.; Martin P.: Essay on Geotechnics.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Urban Hydraulics

Semester / TU	**S2 | T.U.07 - Fundamental Principles of Civil Engineering**	**Module coordinator**	**Ahmed Mansri**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module aims to provide students with the fundamental principles of hydraulics, focusing on the study of incompressible fluids at rest and in motion, with specific applications to pipe flow, open channel flow, and underground flow.

Module learning outcomes	Indicative content
- Identify drinking-water sources and evaluate water requirements. - Calculate head losses in pressurized pipe systems in series, parallel and network configurations. - Explain the operation of drinking-water and wastewater networks. - Design and size drinking-water and wastewater networks. - Identify open-channel flow regimes. - Evaluate pumping rates in confined and unconfined aquifers. - Design basic pumping-station solutions.	• General Introduction Calculation of Linear and Singular Head • Pressurized Pipes • Drinking Water Supply • Stresses in Soils • Open Channel Flow • Groundwater Hydraulics

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Network sizing, head-loss, open-channel-flow, groundwater and pumping calculations are integrated into tutorials; no separate laboratory session is scheduled.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Fluid Mechanics Hydrology	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Tutored Project 1-3

Semester / TU	**S2 | T.U.07 - Fundamental Principles of Civil Engineering**	**Module coordinator**	**Nessrine Essid**
Nature / delivery	Fundamental | Non-presential	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Project-based assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This project focuses on the geotechnical and hydraulic design of a small earth dam. Students will: Characterize the dam site based on given or assumed soil properties. Determine hydraulic loads (water pressure, seepage) based on hydrological data. Design the dam embankment for stability (slope stability, seepage control). Analyze the stability of the dam using Strength of Materials principles

Module learning outcomes	Indicative content
• Apply principles of Soil Mechanics to characterize a dam site and design the embankment. • Use Strength of Materials concepts to analyze the stability of the dam structure. • Integrate Urban Hydraulics principles to determine water flow and loading conditions. • Develop skills in geotechnical and hydraulic design, analysis, and technical reporting.	• Site Characterization and Hydrological Analysis • Embankment Design • Hydraulic Design • Stability Analysis • Report and Presentation

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation.	Supervised project work leading to documented technical deliverables.; Written report and/or oral presentation, as specified in the module brief.	Quality and accuracy of calculations and design: 60%; Understanding and application of relevant principles: 20%; Quality of the report and presentation: 20%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
No formal prerequisite.	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Building Thermal Systems

Semester / TU	**S2 | T.U.08 - Building Physics and Topography**	**Module coordinator**	**Nihed Kilani**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module covers five areas: fundamental thermal concepts, heat-transfer modes, thermal comfort, thermal balance and wall insulation. It develops the ability to evaluate envelope performance and select appropriate thermal solutions.

Module learning outcomes	Indicative content
• Understand the theoretical basis of building thermal behavior. • Perform heat transfer calculations for building envelope components. • Evaluate thermal comfort according to relevant standards. • Apply appropriate thermal insulation solutions for building applications. • Ensure compliance with current thermal performance requirements.	• General thermal concepts and units. • Heat transfer by conduction and thermal conductivity. • Thermal resistance, conductance and temperature distribution through walls. • Thermal comfort, comfort indicators and comfort zones. • Heating and cooling loads and simplified thermal balances. • Thermal-insulation materials and performance requirements.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Heat-transfer, thermal-resistance, comfort and thermal-balance calculations are integrated into tutorial sessions.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
This module builds on knowledge of thermics and thermodynamics.	http://docinsa.insa-lyon.fr/polycop/download.php?id=160504&id2=0.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Topography

Semester / TU	**S2 | T.U.08 - Building Physics and Topography**	**Module coordinator**	**Ahmed Mansri**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module aims to provide students with the fundamental principles of topography, covering the study of measuring instruments, topographic calculations, planimetric methods, area calculation, and the applications of topography in public works.

Module learning outcomes	Indicative content
• Recognize different topographic instruments. • Take measurements of distances, angles, and elevations. Calculate rectangular coordinates and areas. • Understand the importance of topography in civil engineering.	• General Overview Theodolite • Study of Measuring • Calculations in the Rectangular • Planimetric Methods (Introduction) • Area Calculation Topographic • Application of Topography to Public Works

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Laboratory/practical or application-based learning; Software-supported learning.	Level - Theodolite - Total Station	Laboratory work: 20%; Attendance and participation + Midterm examination: 20%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
No formal prerequisite.	Lapointe L., Meyer G., Applied Topography for Public Works, Buildings, and Urban Surveys (4th edition).; Eyrolles Editions, Paris, 1991.; Chaussier J-B., Introduction to Geology and Topography for Assistant Geologists, Site Technicians, and Mining Operators.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Building Acoustics

Semester / TU	**S2 | T.U.08 - Building Physics and Topography**	**Module coordinator**	**Ahlem Sdiri**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module aims to introduce the fundamental principles of acoustics and apply them to the building sector. It covers the physics of sound, acoustic quantities, sound propagation, room acoustic treatment, and techniques for noise isolation against various types of noise.

Module learning outcomes	Indicative content
• Understand the physical phenomena related to sound. • Master acoustic quantities and their use. • Analyze sound propagation in air and within buildings. • Design acoustic treatment solutions for rooms. • Implement isolation techniques for airborne, impact, and equipment noise. • Apply the current acoustic regulations.	• Generalities Physical Nature of Sound: Sound • Sound Acoustic Pressure • Acoustic Quantities Sound Pressure • Sound Propagation in Air • Improving Intelligibility, Reducing Sound • Airborne Noise Insulation • Impact and Equipment

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Sound-level, reverberation, absorption and insulation calculations are integrated into tutorial sessions.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Physics	J.-G. Migneron, Building Acoustics; NF EN ISO 12354, Building acoustics – Estimation of acoustic performance of buildings from the performance of elements.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

English II

Semester / TU	**S2 | T.U.09 - Human Sciences and Engineering Culture II**	**Module coordinator**	**Rabeb Hamrouni**
Nature / delivery	Transversal | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Continuous assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

• This module is meant to be a follow up to the first semester course. It goes into details to explore the domain of Civil Engineering deeply. In fact, it exhibits some of the most prominent building design, types of building structures, and the types of excavations. • Moreover, it introduces the students to more advanced grammar lessons.

Module learning outcomes	Indicative content
- Recognize and describe common building designs. - Differentiate the main types of building structures. - Distinguish the principal types of excavations. - Use more advanced English grammar in technical communication and read, interpret and comment on graphs.	Continuation of technical English for Civil Engineering, with emphasis on building designs, structural types and excavation methods, combined with more advanced grammar and graph interpretation.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Interactive language practice and presentations.	Technical-vocabulary, grammar, graph-reading, research and oral-presentation activities are integrated into class sessions.	Continuous assessment / project deliverables: 100%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Students should have enough knowledge of the basic vocabulary related to Civil Engineering in English. They also need to be familiar with basic English grammar points.	Cambridge English for engineering.

Language of instruction: English | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Site Visits

Semester / TU	**S2 | T.U.09 - Human Sciences and Engineering Culture II**	**Module coordinator**	**Direction of Studies and Internships**
Nature / delivery	Transversal | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Continuous assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

The Site Visits module aims to introduce first-year students to the field of civil engineering, particularly to the processes of preparing raw materials in civil engineering and the basic structures of a building project.

Module learning outcomes	Indicative content
• Get acquainted with construction site work. • Understand the processes of preparing raw materials in civil engineering by visiting quarries, cement plants, and brickworks.	• Preparation, objectives and safety briefing for each visit. • Observation of construction-site organisation, work sequences and professional roles. • Visits to quarries, cement plants, brickworks and/or active construction sites as available. • Identification of materials, production processes and quality-control practices. • Field notes, technical reflection and visit reporting.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Field-based learning; Guided observation; Reflective reporting and discussion.	Guided practical work or laboratory/application sessions as specified in the validated weekly plan.	Continuous Assessment: 100%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Construction Materials	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Industrial Culture

Semester / TU	**S2 | T.U.09 - Human Sciences and Engineering Culture II**	**Module coordinator**	**Jihene Jaouadi**
Nature / delivery	Transversal | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

For this module, it is necessary to know the notions of work study through the method of timing and sampling (present the steps of calculation and the necessary formulas). In addition, you will learn about inventory management (production flows, stocks, etc.), stock classification (ABC method), inventory management operations (warehousing, stocktaking, etc.), and the costs associated with inventory management (cost of transfer, cost of ownership, etc.). This module will conclude with a final chapter on scheduling methods (P.E.R.T. network, its construction and the steps involved in calculating dates, etc.).

Module learning outcomes	Indicative content
• In this introductory chapter, we'll try to explain the importance of production and quality within the company (History). • We will deal with the study of work using two methods: timing and sampling.All, explaining the necessary calculations • Importance of stock management within the company /types of storage and their location /The ABC method and its importance for item classification /Wilson's method. • The different scheduling methods: GANTT chart and PERT network graphic presentation and methods for calculating DTO, DTA, FTO, FTA dates and margins)	• Work study: timing and sampling • Stock and supply • Method of replenishment • Project scheduling Explanation of the calculation of the various

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Work study exercises: timing, sampling and distinguishing between the two methods.; exercises on inventory management and the treatment of the ABC method and the Wilson method and their importance for businesses.; Exercises on the different scheduling methods (PERT network, CPM, etc.)	Midterm examination +participation: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
*Work study: timing, sampling * inventory supply management (storage methods, ABC method) * project scheduling(GANTT method, PERT, probabilistic PERT)	Introduction a l'etude du travail, International Labour Organization, 1995; P. Ardilly, Echantillonnage et methodes de travail, Dunod, 2004; P. Fournier and J.P. Menard, Gestion de l'approvisionnement et des stocks, Eyrolles, 2004; resources on inventory management and PERT/project scheduling supplied by the instructor.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Operational Research and Optimization

Semester / TU	**S3 | T.U.10 - Structural Mechanics and Optimization**	**Module coordinator**	**Hanen Najjar**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module introduces the discipline of operations research and optimization. It deals mainly with the optimization of certain decision problems using linear programming. The problem of allocating scarce resources is one of the cases examined in this module.

Module learning outcomes	Indicative content
• Formulate engineering and management problems as linear programmes. • Apply graphical, enumeration and simplex solution methods. • Derive and interpret dual models and marginal values. • Conduct sensitivity analysis and interpret changes in optimal solutions. • Use LINDO to solve and interpret selected optimisation problems.	• Formulation of engineering and management problems as linear programmes. • Graphical and enumeration solution methods. • Simplex algorithm and treatment of special cases. • Primal-dual relationships and marginal values. • Sensitivity analysis and interpretation of optimal solutions. • Use of LINDO for selected engineering and management applications.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Laboratory/practical or application-based learning; Software-supported learning.	Applied optimization exercises using LINDO software to formulate, solve and interpret linear-programming problems and to study the influence of model parameters on engineering or management decisions.	Midterm examination: 20%; Laboratory work: 20%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Some knowledge of mathematics is required for this module: - Graphical representation of lines - Matrix and matrix calculus	Glicksman , An introduction to linear programming and the theory of games; Kaufmann, Methods and models of operations research,; Dantzig applications and extensions of linear programming,

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Plates and Shells

Semester / TU	**S3 | T.U.10 - Structural Mechanics and Optimization**	**Module coordinator**	**Sonia Ben Mbarek**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

Chapter 1: General Theory of Plate Bending Chapter 2: Rectangular Plates Chapter 3: Circular Plates Chapter 4: Shells

Module learning outcomes	Indicative content
• Understand the fundamental theories governing the behavior of plates and shells. • Develop models and perform analyses of rectangular and circular plates subjected to different loading scenarios and boundary constraints. • Comprehend the fundamental concepts of shell analysis and their relevance to civil engineering structures. • Utilize the learned principles to address practical engineering design challenges related to plates and shells.	Chapter 1: general theory of plate bending. Chapter 2: rectangular plates. Chapter 3: circular plates. Chapter 4: shells, with demonstrations and guided exercises.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Analytical demonstrations and guided calculations for rectangular plates, circular plates and shells are integrated into directed-work sessions.	Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Reinforced Concrete Strength of Materials	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Reinforced Concrete I

Semester / TU	**S3 | T.U.10 - Structural Mechanics and Optimization**	**Module coordinator**	**Najeh Graja**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module aims to provide students with the theoretical and practical foundations for the design of reinforced concrete structures, in accordance with the BAEL 91 regulations. It covers material properties, safety concepts, the behavior of reinforced concrete elements under different loads (tension, compression), and design methods.

Module learning outcomes	Indicative content
• Understand the fundamental mechanics of reinforced concrete. • Implement safety principles and action combinations in accordance with relevant codes. • Determine the bond strength/bond stress between steel reinforcement and concrete. • Calculate the required reinforcement for members under axial tension and compression. • Understand how reinforcement contributes to the strength and ductility of concrete structures. • Apply calculated values to the practical design of simple reinforced concrete elements.	• Basics of Reinforced • Notion of Safety – • Steel-Concrete Bond (Adhesion) • Simple Tension • Simple Compression "Columns "

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Code-based design exercises for bond, tension and compression members are integrated into tutorial sessions.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Solid Mechanics Strength of Materials	Practical Application of the BAEL 91, J.; Roux, Eyrolles Publishing Reinforced Concrete; Calculation Guide, J.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Structural Mechanics

Semester / TU	**S3 | T.U.10 - Structural Mechanics and Optimization**	**Module coordinator**	**Najeh Graja**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module aims to provide students with the tools and methods necessary to analyze the behavior of structures subjected to various loads. It covers the fundamental concepts of structural mechanics, the analysis of isostatic and hyperstatic structures, as well as energy methods.

Module learning outcomes	Indicative content
• Understand the fundamental concepts of structural mechanics. • Analyze isostatic structures and determine the internal forces. • Calculate the deformations of structures using energy methods. • Analyze hyperstatic structures using the force method and the displacement method. • Apply the acquired knowledge to practical civil engineering problems.	• Fundamental Concepts of Structural • Analysis of Isostatic • Deformations and Energy • Analysis of hyperstatic • Analysis of Hyperstatic

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Guided analysis of isostatic and hyperstatic structures, deformations and energy methods is integrated into tutorial sessions.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Solid Mechanics Strength of Materials	A. Samikian, Analysis and Calculation of Structures, Gaetan Morin, 1994; R.C. Hibbeler, Structural Analysis, Prentice Hall, 2012; P. Lestuzzi, Analysis of Structures and Continuous Media - Hyperstatic Structures, EPFL.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Tutored Project 1-2

Semester / TU	**S3 | T.U.10 - Structural Mechanics and Optimization**	**Module coordinator**	**Najeh Graja**
Nature / delivery	Fundamental | Non-presential	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Project-based assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

The source handbook did not contain a separate description. The validated learning outcomes and indicative content below define the module scope.

Module learning outcomes	Indicative content
• Optimise a reinforced concrete structural concept using operations-research methods and stated design constraints. • Analyse structural behaviour using Structural Mechanics and plate/shell theory. • Design reinforced concrete elements in accordance with the relevant standards. • Develop and interpret a structural-analysis software model and communicate the technical results.	• Project Definition and Design Constraints • Operations-Research-Based Optimisation • Structural Mechanics and Plate/Shell Analysis • Reinforced Concrete Design to Standards • Structural Software Modelling • Technical Report and Presentation

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation; Software-supported learning.	Supervised project work leading to documented technical deliverables.; Written report and/or oral presentation, as specified in the module brief.	Continuous assessment / project deliverables: 100%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
No formal prerequisite.	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Design and Calculation of Roads

Semester / TU	**S3 | T.U.11 - Transportation, Geotechnics and Planning**	**Module coordinator**	**Ahmed Mansri**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module aims to provide students with the knowledge and skills necessary for the geometric design, dimensioning, and construction of roads. It covers aspects related to alignment, geotechnics, earthworks, pavement structures, materials, drainage, and intersections.

Module learning outcomes	Indicative content
• Develop the geometric characteristics of a road: the alignment plan, the longitudinal profile, and the cross-sectional profile. • Define circular and parabolic curves for each category of road. • Define the pavement structure and determine the thicknesses of the layers that make up the pavement	• Generalities Basic Principles of Road Alignment • Alignments and Geometric • Geotechnical Engineering for Roads • Road Earthworks Techniques for Earthworks • Road Pavement Structures • Road Materials with hydraulic • Road intersections

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Software-supported learning.	Geometric road-design, earthworks, pavement and intersection calculations are integrated into tutorial and application sessions.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
No formal prerequisite.	Jeuffroy: Design and Construction of Road Pavements, Volume 1 and 2, Eyrolles Editions, 1985.; Dubet: Elementary Course on Road Construction, Eyrolles Editions, 196X.; Allegret: Course on Alignment Design and Earthworks, Eyrolles Editions, 1967, 1959.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Urban Transport Planning

Semester / TU	**S3 | T.U.11 - Transportation, Geotechnics and Planning**	**Module coordinator**	**Houssin Naieb**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This teaching handout is addressed to second-year civil engineering students. Through this module titled Mobility and Transport, our goal is, on the one hand, to provide students with the essential skills in urban transportation, particularly in response to the growing demand for transport and the significance of challenges related to urban mobility, and on the other hand, to teach them the knowledge related to the interaction between transport, mobility, and urbanization, in order to understand the correlation between urban form and the transport/mobility component.

Module learning outcomes	Indicative content
• Comprehend the core principles of urban mobility and transportation. • Analyze the complex interactions between transport, mobility, and urbanization. • Identify and evaluate the problems and challenges associated with urban transport planning and propose potential solutions. • Utilize learned principles to address practical urban mobility challenges and develop effective solutions. • Understand the importance of sustainable transport solutions in urban areas.	• Concepts of Urban Mobility and Sustainable Mobility • Concept of Urban Transport • Interaction between Transport, Mobility and Urbanisation

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Case analysis and planning exercises on mobility, transport and urbanisation are integrated into tutorial sessions.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
For the prerequisites, learners must have knowledge particularly in: - Previous knowledge related to the themes of urbanization and urban form of the city. - Prior knowledge of mobility-related vocabulary. - Prior knowledge of the vocabulary related to the concept of transport.	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Soil Mechanics II

Semester / TU	**S3 | T.U.11 - Transportation, Geotechnics and Planning**	**Module coordinator**	**Najeh Graja**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	No earlier amendment date documented	**Current academic review**	23 August 2026

Module description

This module delves deeper into the study of the mechanical behavior of soils, focusing on shear strength, the design of shallow foundations, and the calculation of earth pressures and thrusts on retaining structures.

Module learning outcomes	Indicative content
• Understand the mechanisms of soil failure by shear. • Determine the shear strength parameters of soils. • Design shallow foundations considering bearing capacity and settlements. • Calculate earth pressures and thrusts on retaining structures. • Select the appropriate type of foundation and retaining structure based on geotechnical conditions.	• Shear strength of soils • Shallow Foundations Design of a footing • Actions of earth on retaining

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Laboratory/practical or application-based learning.	The lab sessions will allow for the experimental application of the concepts covered in the module.; Shear box test; Triaxial test; CBR test (California Bearing Ratio)	Laboratory work: 20%; Attendance and participation + Midterm examination: 20%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Soil Mechanics I Solid Mechanics Fluid Mechanics Strength of Materials	F. Schlosser, Elements of Soil Mechanics, 1988; J.P. Magnan, Soil and Rock Mechanics, 2003; D. Cordary, Soil Mechanics, 1994; A. Aysen, Soil Mechanics: Basic Concepts and Engineering Applications, 2002.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Tutored Project 3-2

Semester / TU	**S3 | T.U.11 - Transportation, Geotechnics and Planning**	**Module coordinator**	**Ahmed Mansri**
Nature / delivery	Fundamental | Non-presential	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Project-based assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This project involves studying an existing urban intersection with congestion, safety, or accessibility issues. Students will: Analyze the existing situation (traffic counts, field observations, accident analysis). Propose several intersection improvement scenarios (roundabout, signalized intersection, improvements for cyclists and pedestrians). Evaluate the performance of each scenario in terms of flow, safety, environmental impact, and cost. Develop a project management plan for implementing the chosen scenario.

Module learning outcomes	Indicative content
• Master the principles of geometric design for intersections. • Apply urban transport planning tools to analyze traffic flow and user needs. • Develop project management skills.	• Structure Selection and Data Collection • Existing Conditions Analysis and Objective Definition • Development and Evaluation of Improvement Scenarios • Detailed Design of the Selected Scenario • Project Management Plan Development • Report and Presentation

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation.	Supervised project work leading to documented technical deliverables.; Written report and/or oral presentation, as specified in the module brief.	Quality of analysis and design: 40%; Relevance of urban transport planning integration: 30%; Quality of the project management plan: 20%; Teamwork and presentation: 10%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
No formal prerequisite.	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Architecture and Urban Planning

Semester / TU	**S3 | T.U.12 - Urban Design and Building Technology**	**Module coordinator**	**Mehdi Lamine**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module aims to introduce students to the fundamental principles of architecture and urban planning, exploring the connections between architecture, science, technology, geometry, graphic representation, and materials. It seeks to develop a comprehensive understanding of the architectural and urban design process.

Module learning outcomes	Indicative content
• Familiarize with architectural culture. • Master the reading of graphic documents (architectural plans, sections, elevations, etc.) Master two-dimensional graphic drawing tools (orthogonal projection)	Architecture, science and technology; descriptive geometry and architectural composition; graphic representation and architectural drawing; traditional and digital representation techniques; construction materials and their technical, aesthetic and environmental selection.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Graphic-reading, orthogonal-projection, architectural-drawing and material-selection exercises are integrated into studio and tutorial activities.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Building Materials DBAO	Aubert, J., "Architectural Drawing from Descriptive Geometry," Editions de LaVillette, Paris, 1980.; Choisy, A., "History of Architecture," Ed.; Vincent Fréal & Cie, Paris, 1964.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Building Equipment and Electricity

Semester / TU	**S3 | T.U.12 - Urban Design and Building Technology**	**Module coordinator**	**Dhaoui Mehdi**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module aims to train civil engineers in the field of building electricity to be able to understand the standards and install building electrical systems.

Module learning outcomes	Indicative content
• Know the safety standards in building electricity. • Familiarize yourself with the different lighting fixtures in living quarters. • Differentiate the different representations of a diagram. • Decode the electrical part of an architectural plan. • Understand the functions of the different elements of a lighting installation. • List the different assemblies and understand their operating principles.	• Building Electricity • Diagrams and equipment used in electrical installations • Voltage drop calculations and choice of cable section

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	The laboratory component of this module will provide practical work to develop different practical assemblies that will cover different aspects of this module.	Midterm examination: 30%; Problem sets (individual/group coursework): 10%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
General knowledge of electricity	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Computer Science III

Semester / TU	**S3 | T.U.12 - Urban Design and Building Technology**	**Module coordinator**	**Anouar Ben Abdennour**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module develops advanced Excel skills for civil-engineering applications, including engineering calculations, automation with VBA, project scheduling, cost and resource tracking, data processing, dashboards and technical reporting.

Module learning outcomes	Indicative content
• Apply advanced Excel functions to solve complex civil engineering problems, including structural design, load analysis, and financial estimation. • Create automated Excel models using VBA to streamline repetitive engineering tasks such as calculations and reporting. • Design and implement project management tools in Excel, such as Gantt charts, cost estimation templates, and resource tracking. • Analyze and manipulate large datasets using Power Query, PivotTables, and other Excel tools to derive actionable insights for engineering projects. • Present engineering data visually using advanced charting techniques and create interactive dashboards for project monitoring and reporting.	Advanced Excel applications for Civil Engineering: engineering calculations and data management; advanced formulas; VBA automation and macros; project scheduling and cost/resource management; Power Query, PivotTables, charts and dashboards; integrated civil-engineering spreadsheet project.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Laboratory/practical or application-based learning; Software-supported learning.	Hands-on Excel work: structural and load calculations; reinforced-concrete beam and column calculations; VBA automation; Gantt charts and project-management tools; PivotTables, Power Query and dashboards; cost and budget tracking; final integrated engineering spreadsheet project.	Attendance and participation: 5%; Laboratory work and supervised assessment: 35%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Basic proficiency in Excel. A fundamental understanding of civil engineering principles and practices.	Delorme, Laurent.; Microsoft Excel pour le génie civil et le bâtiment. Éditions Eyrolles, 2021.; ENI Éditions.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Occupational Health and Safety Management and Continuous Improvement (ISO 45001:2018)

Semester / TU	**S3 | T.U.13 - Human Sciences and Engineering Culture III**	**Module coordinator**	**Faten Chibani**
Nature / delivery	Transversal | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module examines (1) the primary tools and methods used to monitor and control occupational health and safety (OH&S) in organizations and (2) the strategies for improving OH&S performance. Included in the module are topics such as the historical development of OH&S management, hazard identification and risk assessment techniques, and management strategies for implementing world- class occupational health and safety improvement practices. Emphasis is also given to incident analysis, safety performance monitoring, control measures, and compliance with ISO 45001:2018 requirements.

Module learning outcomes	Indicative content
- Explain the principles, structure and continual-improvement logic of an occupational health and safety management system and ISO 45001:2018. - Identify hazards and assess OH&S risks in engineering and workplace situations. - Select and justify appropriate risk-control measures and safe-work practices. - Formulate OH&S policy, objectives and implementation actions, including worker participation and legal compliance. - Analyse incidents and use performance indicators to monitor OH&S performance. - Apply internal-audit principles and evaluate conformity with ISO 45001 requirements.	Evolution and concepts of occupational health and safety management; hazard identification and risk assessment; leadership, OH&S policy and objectives; worker participation and legal requirements; ISO 45001:2018 structure and requirements; incident analysis, performance monitoring, audits and continual improvement.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Case-study analysis; Collaborative learning.	Applied case studies and exercises on hazard identification, risk assessment, OH&S policy and objectives, worker participation, ISO 45001 implementation, incident/performance analysis and internal/external audit preparation.	Attendance and participation: 5%; Laboratory work and supervised assessment: 35%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Students should possess effective communication and collaboration skills to participate in case studies, group discussions, and project activities.	ISO 45001:2018; Occupational Health and Safety Management Systems: Requirements with Guidance for Use.; International Organization for Standardization.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Problem Solving and Decision Making

Semester / TU	**S3 | T.U.13 - Human Sciences and Engineering Culture III**	**Module coordinator**	**Faten Chibani**
Nature / delivery	Transversal | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module provides students with the knowledge and skills to address complex engineering problems through structured problem-solving techniques. Students will learn to use tools such as Ishikawa diagrams, brainstorming techniques, and the 5S methodology to identify root causes and develop practical solutions. The curriculum emphasizes collaborative brainstorming sessions to generate innovative ideas and approaches for tackling engineering challenges. In addition, students will explore the integration of multivariate analysis to assess and prioritize multiple contributing factors simultaneously.

Module learning outcomes	Indicative content
• Problem Identification: Analyze and prioritize real-world engineering issues. • Analytical Tools: Apply frameworks like Ishikawa diagrams and SWOT analysis. • Innovative Solutions: Design practical, efficient, and sustainable solutions. • Strategic Planning: Develop structured action plans with clear methodologies. • Decision-Making: Use multi-criteria techniques like cost-benefit analysis and AHP. • Performance Monitoring: Implement KPIs for tracking and continuous improvement.	• Problem identification, prioritisation and impact-feasibility analysis. • Root-cause analysis using Ishikawa diagrams and related tools. • Brainstorming, SWOT analysis and generation of alternative solutions. • Multi-criteria decision tools, including cost-benefit analysis and AHP. • Action planning using QQOQCP and clear responsibilities and deadlines. • KPI design, monitoring, reporting and continual improvement.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Case-study analysis; Collaborative learning.	Engineering case studies, root-cause analysis, multi-criteria decision exercises, action planning and KPI design are integrated into practical class activities.	Attendance and participation: 5%; Supervised assessment: 35%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
No formal prerequisite.	Group Decision-Making and Problem Solving http://managementhelp.org/groups/group-decision-making.htm

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

English III

Semester / TU	**S3 | T.U.13 - Human Sciences and Engineering Culture III**	**Module coordinator**	**Rabeb Hamrouni**
Nature / delivery	Transversal | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

• This module presents a follow up part for first year, where students learnt new English vocabulary related to civil engineering. In fact, they need to recognize all the methods of soil testing and to distinguish them using their appropriate labels, as well as recognizing the different types of cement. • It focuses on more serious subject matters within civil engineering.

Module learning outcomes	Indicative content
• Describe soil-testing methods and procedures in technical English. • Use appropriate terminology for cement types and floor and sub-floor construction. • Apply past tenses, relative pronouns and reported speech in technical contexts. • Research and present selected civil-engineering topics.	• Technical English for soil-testing methods and procedures. • Terminology for cement types and floor and sub-floor construction. • Past simple and past perfect. • Relative pronouns and reported speech. • Technical reading, short research tasks and oral presentations.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Interactive language practice and presentations.	Technical-vocabulary, grammar, reading, research and oral-presentation activities are integrated into class sessions.	Continuous assessment and coursework: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Students must be familiar with different civil Engineering vocabulary in English. They have to memorize the civil engineering equipment and components. Moreover, they need to know how to recognize the building materials and express the role of each component using their own words. Finally, they should use basic English tenses accurately to express themselves.	Cambridge English for engineering.

Language of instruction: English | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Analysis of Structures Using Finite Elements

Semester / TU	**S4 | T.U.14 - Finite Element Analysis of Structures**	**Module coordinator**	**Zouhayar Al-Adel**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module focuses on methods for structural analysis using finite elements and is intended for civil engineering students. It is composed of: 1- Fundamental concepts of the finite element method 2- Strain energy principles 3- Equilibrium approach 4- Approximation methods 5- Calculation techniques at the element level 6- Calculation techniques at the global level 7- Solution methods for static and dynamic analysis 8- General-purpose codes 9- Applications to plates and shells

Module learning outcomes	Indicative content
• Understand the principles of the finite element method and strain energy concepts. • Apply the equilibrium approach and approximation methods to solve complex problems. • Use elementary and global calculation techniques to assemble systems of equations. • Analyze structures in static and dynamic conditions using computational software. • Apply the method to plates and shells for thin and curved structures.	• Fundamental concepts of the finite element method. • Strain-energy principles and the equilibrium approach. • Approximation methods and element-level formulation. • Global assembly, boundary conditions and system solution. • Static and dynamic structural analysis. • General-purpose finite-element codes. • Applications to plates and shells.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Software-supported learning.	Finite-element formulation, matrix assembly and solution exercises are integrated into tutorials; software-supported demonstrations are used for selected structural applications.	Weight, (%) Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Mechanics of materials (stress, strain, elasticity and plasticity); strength of materials and internal-force calculations; applied mathematics (matrix algebra, differential calculus and linear systems); statics and structural analysis; introductory numerical methods; basic MATLAB/programming familiarity is recommended.	J. N. Reddy, Introduction to the Finite Element Method; D. L. Logan, A First Course in the Finite Element Method; N. S. Gokhale et al., Practical Finite Element Analysis; O. C. Zienkiewicz and R. L. Taylor, The Finite Element Method.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Reinforced Concrete II

Semester / TU	**S4 | T.U.15 - Design of Concrete and Steel Structures**	**Module coordinator**	**Ahlem Sdiri**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module delves into the study of reinforced concrete, focusing on common stresses in structures: simple bending, shear force and combined bending. It is based on the BAEL 91 regulations, providing students with the necessary tools to size and check reinforced concrete structural elements.

Module learning outcomes	Indicative content
• Understand the behavior of reinforced concrete under simple bending, shear force, combined bending, and torsion. • Apply the design and calculation rules of BAEL 91. • Size the longitudinal and transverse reinforcements to resist the different stresses. • Check the stresses and deformations of reinforced concrete elements. • Use the charts and calculation tools of BAEL 91.	• Simple Bending BAEL 91 for simple bending. • Shear Force Calculation of transverse • Combined Bending Calculation at ULS

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Code-based design exercises for bending, shear and combined bending are integrated into tutorial sessions.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Reinforced Concrete I Strength of Materials	Practical application of BAEL 91, J.; Roux, Eyrolles Publishing Reinforced Concrete; Design Guide, J.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Prestressed Concrete

Semester / TU	**S4 | T.U.15 - Design of Concrete and Steel Structures**	**Module coordinator**	**Ahlem Sdiri**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

The objective of this module is to familiarize students with the principles of prestressed concrete, the different methods, materials, safety considerations, the calculation of prestress losses, and the design of isostatic structures. It complements the knowledge acquired in reinforced concrete and opens the way to more specific applications in the field of structures.

Module learning outcomes	Indicative content
• Prestressing: General overview, operating principle, and construction methods. • Material characteristics and devices. • Safety of prestressed concrete structures: Actions, Limit States, and Regulations. • Evaluation of prestress losses. • Design of isostatic prestressed concrete structures.	• Prestressed Concrete – • Characteristics of materials • Concept of safety - Load • Evaluation of prestress losses • Design of isostatic

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Guided calculations on prestressing methods, losses, safety checks and isostatic-beam design are integrated into tutorial sessions.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Reinforced Concrete I & II Strength of Materials	Le Delliou: Prestressed Concrete according to the Eurocodes; University Press of Lyon (PUL), 15/12/2003, ISBN: 2-7297-0724-7 Chaussin, A.; Perchat: Prestressing; Presses of the National School of Bridges and Roads (ENPC), 01/12/1992

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Design and Calculation of Steel Structures

Semester / TU	**S4 | T.U.15 - Design of Concrete and Steel Structures**	**Module coordinator**	**Hadef Nidhel**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module covers the fundamental principles of design and calculation of steel structures. It addresses materials, profiles, basic calculations, the strength of sections and elements, instability phenomena, and connections. The teaching will be based on the Eurocodes.

Module learning outcomes	Indicative content
• Select appropriate steel sections and connection types for a structural system. • Verify steel members and connections in accordance with the applicable Eurocode requirements.	• Introduction to Steel Structures and Eurocodes • Steel Materials and Mechanical Characteristics • Common Steel Profiles and Section Classification • Design Principles and Load Combinations • Section Resistance at ULS and SLS • Member Stability and Buckling • Bolted and Welded Connections

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Eurocode-based section, member-stability and connection-design exercises are integrated into tutorial sessions.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Structural Mechanics Strength of Materials	Steel Construction Regulations according to Eurocode 3; J. Morel, Calculation of Steel Structures according to Eurocode 3, 1997; M.A. Hirt and M. Crisinel, Steel Structures, Volumes 10 and 11, 2001.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Design and Calculation of Civil Engineering Structures

Semester / TU	**S4 | T.U.16 - Structural Design and Analysis**	**Module coordinator**	**Nessrine Essid**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module introduces civil-engineering structures and their performance requirements, with particular emphasis on bridge design. It covers bridge classification, project data and constraints, reinforced- and prestressed-concrete bridge concepts, bridge equipment, load regulations, transverse load distribution using the Guyon-Massonnet method, and influence lines.

Module learning outcomes	Indicative content
• Understand civil engineering structures: Identify the types of civil engineering structures, their areas of application, and the required performance. • Analyze rolling loads: Apply specific rolling loads for bridges and select the necessary equipment. • Respect functional and natural constraints: Integrate functional and environmental criteria into the design of a civil engineering structure. • Design reinforced and prestressed concrete bridges: Apply design principles for these structures. • Select bridge equipment: Identify and integrate the necessary equipment for proper bridge operation. • Apply load regulations on bridges: Know and apply the current standards and regulations.	• General information and classification of civil-engineering structures. • Data, functional constraints and natural constraints for bridge projects. • Conceptual design of reinforced- and prestressed-concrete bridges. • Bridge equipment and operational requirements. • Bridge load regulations and applicable standards. • Transverse load distribution using the Guyon-Massonnet method. • Influence lines for bridge analysis.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Bridge-classification, load, transverse-distribution and influence-line calculations are integrated into tutorial and project-based activities.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Mechanics of materials; strength of materials; structural analysis of isostatic and hyperstatic systems; reinforced and prestressed-concrete design fundamentals; soil mechanics and basic soil-structure interaction. These prerequisites support bridge and civil-engineering-structure analysis and design.	[1] Course on Civil Engineering Structures, Mongi Ben Ouezdou, ENIT [2] Bridge Construction Project [3] Course and Application of Prestressed Concrete

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Design and Calculation of Building Structures

Semester / TU	**S4 | T.U.16 - Structural Design and Analysis**	**Module coordinator**	**Nessrine Essid**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module is intended for civil engineering students. It is composed of: I. ACTIONS AND LOADS II. REGULATIONS 1. Calculation of loads 2. Special rules applicable to common buildings III. DESIGN AND CALCULATION OF BUILDING FRAME ELEMENTS 1. Foundations 2. Slabs 3. Precast slabs 4. Slabs, hollow blocks, floors, roofs 5. Beams and columns 6. Load-bearing walls 7. Load-bearing masonry 8. Shear walls, stairs, openings, cantilevers, balconies 9. Short cantilevers IV. BRACING 1. General design 2. Bracing elements a. Columns b. Stability frames c. Partition walls V. SEISMIC ACTIONS: temperature, settlement, creep, shrinkage VI. FIRE RESISTANCE

Module learning outcomes	Indicative content
- Apply actions, loads and regulatory requirements to building-structure design. - Analyse and design foundations, slabs, floors, beams, columns, walls, stairs, cantilevers and related structural elements. - Design bracing systems and assess overall structural stability. - Evaluate seismic, thermal, settlement, creep and shrinkage effects. - Verify fire resistance of structural elements. - Integrate safety, durability and performance requirements in building design.	• Actions, loads, load combinations and regulatory requirements. • Design of foundations, slabs, floors, beams, columns, walls and masonry elements. • Design of stairs, openings, cantilevers, balconies and short corbels. • General bracing design, stability frames and partition walls. • Seismic actions and the effects of temperature, settlement, creep and shrinkage. • Fire-resistance verification of structural elements.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Integrated building-design calculations for loads, structural elements, bracing, seismic actions and fire resistance are developed through guided applications.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
A solid understanding of the basics of general mechanics (kinematics, dynamics of solids), as well as fundamental concepts in strength of materials and applied mathematics (differential systems).	B. Mathieu and M. Fremy, Practice of Reinforced Concrete: BAEL 91 revised 99; O. Ritz, Calculation of Reinforced Concrete Structures: BAEL 91 Rules; G. Dupraz, Dimensioning Reinforced Concrete Structures with BAEL; solved exercises and regulatory documentation supplied by the instructor.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

General Construction Processes

Semester / TU	**S4 | T.U.17 - Construction Technology and Building Services**	**Module coordinator**	**Houssin Naieb**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module aims to provide students with an in-depth understanding of general construction processes used in the field of civil engineering. It focuses on earthworks and formwork, covering both theoretical and practical aspects. By the end of the module, students will be able to: • Understand the different phases of earthwork operations. • Select appropriate equipment and earthwork methods based on the context. • Design and size formwork for various types of structures. • Master safety aspects related to earthworks and formwork activities. • Integrate environmental considerations into the selection of construction processes.

Module learning outcomes	Indicative content
•• Understand Earthwork Techniques. • Understand Foundation Layout Techniques. • Understand Formwork Techniques.	• Earthworks • Foundations • Concrete Production and Placement • Formwork • Construction Execution Processes

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Construction-method, formwork, excavation, concreting and site-organisation case exercises are integrated into directed-work sessions.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Design and Calculation of Reinforced Concrete Structures Soil Mechanics I &II. Design and Calculation of Roads.	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Reinforced Concrete Tanks

Semester / TU	**S4 | T.U.17 - Construction Technology and Building Services**	**Module coordinator**	**Nessrine Essid**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1 ECTS | 25 h total (15 h structured + 10 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module is intended for civil engineering students. It is divided into two main parts: Part 1: Reservoirs I. General Overview II. Circular Reservoirs on Soil III. Rectangular Reservoirs IV. Case of Open Basins with Large Surface Area and Low Height V. Case of Covered Basins with Large Surface Area and Low Height VI. Reinforcement Layout VII. Foundation Slab (Radier) Part 2: Silos I. General Overview II. Static Analysis III. Dynamic Analysis

Module learning outcomes	Indicative content
• By the end of this module, the student will be able to: • Design a reinforced concrete (RC) reservoir. • Size a reinforced concrete (RC) reservoir. • Model a reinforced concrete (RC) reservoir using Robot. • Design a reinforced concrete (RC) silo. • Size a reinforced concrete (RC) silo.	• Actions, load cases and design principles for reinforced-concrete reservoirs and silos. • Circular and rectangular tanks and open or covered basins. • Hydrostatic pressure, serviceability and crack-control requirements. • Wall, slab and foundation-slab design and reinforcement detailing. • Guided numerical modelling of reservoirs using Robot. • Basic static and dynamic considerations for silos.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Reservoir and silo design calculations, detailing tasks and guided Robot modelling are integrated into application sessions.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Material mechanics; strength of materials; static and dynamic structural analysis; soil mechanics and soil-structure interaction; fluid mechanics and hydraulics relevant to tanks/basins; applied mathematics. These prerequisites support the design of reinforced-concrete reservoirs and silos.	1- "Treatise on Reinforced Concrete (T5, T6, T8)", A.; Guerrin, GCV 76.; 2- "Design and Calculation of Building Structures, T5", Henry Thonier, GCV 876.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Tutored Project 2-2

Semester / TU	**S4 | T.U.17 - Construction Technology and Building Services**	**Module coordinator**	**Nessrine Essid**
Nature / delivery	Fundamental | Non-presential	**Frequency / duration**	Annually | One semester
ECTS / workload	1 ECTS | 25 h total (15 h structured + 10 h independent)	**Assessment mode**	Project-based assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This project will involve the complete design and analysis of one or more reinforced concrete structures, chosen from reservoirs (circular, rectangular, open, or covered) and silos. Students will perform structural calculations, determine reinforcement requirements, and create a numerical model using Robot Structural Analysis (or similar software). The project will emphasize practical application of design codes (e.g., Eurocodes, ACI) and consideration of relevant factors such as soil conditions, loading scenarios (static and dynamic for silos), and construction methods.

Module learning outcomes	Indicative content
• Accuracy and validity of the numerical model and analysis (30%). • Quality of the written reports and oral presentation (20%). • Teamwork, participation, and adherence to project schedule (10%).	• Project Definition and Literature Review • Preliminary Design and Analysis • Detailed Structural Analysis and Design • Numerical Modeling and Validation • Final Report and Presentation

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation; Software-supported learning.	Supervised project work leading to documented technical deliverables.; Written report and/or oral presentation, as specified in the module brief.	Continuous assessment / project deliverables: 100%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
No formal prerequisite.	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Air Conditioning and Heating

Semester / TU	**S4 | T.U.17 - Construction Technology and Building Services**	**Module coordinator**	**Nihed Kilani**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module covers the fundamental principles of air conditioning and heating systems for buildings, with a focus on thermal comfort, energy demand calculations, ventilation systems, and system sizing.

Module learning outcomes	Indicative content
- Design a simple building heating and air-conditioning system. - Analyse the operation and sizing principles of the principal components of heating, ventilation and air-conditioning systems.	• INDOOR COMFORT CONDITIONS • Heating of Indoor Spaces • VENTILATIO N Sizing of fans • Sizing of air • Air conditioning

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Thermal-load, psychrometric, system-selection and HVAC-sizing exercises are integrated into tutorial sessions.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
No formal prerequisite.	[1] “Production of Heat and Cold” – J.; Bouteloup et al. (Parisian Editions). [2] Techniques of Engineering. [3] RT Building.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

End-of-Year Project

Semester / TU	**S4 | T.U.18 - Capstone Project in Structural Engineering**	**Module coordinator**	**Head of Civil Engineering Department**
Nature / delivery	Fundamental | Non-presential	**Frequency / duration**	Annually | One semester
ECTS / workload	1 ECTS | 25 h total (15 h structured + 10 h independent)	**Assessment mode**	Project-based assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

Students will design a small residential building (e.g., a single-family house or a small apartment building) in Gabes. They will use Revit Structure to create a Building Information Model (BIM) and ARCHE to perform structural analysis and design.

Module learning outcomes	Indicative content
• Integrate ARCHE and Revit Structure for a complete building design workflow. • Apply knowledge of reinforced concrete design and structural analysis. • Produce professional-quality structural drawings and documentation. • Consider local building practices and materials available in Gabes.	• Architectural Design and Conceptual Modeling (Revit) • Structural Modeling and Analysis (Revit & ARCHE) • Reinforcement Detailing and Documentation (Revit) • Documentation and Presentation

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation; Software-supported learning.	Supervised project work leading to documented technical deliverables.; Written report and/or oral presentation, as specified in the module brief.	Correct application of ARCHE for structural analysis and design: 40%; Proficient use of Revit Structure for BIM modeling and documentation: 30%; Quality and completeness of the design/retrofit solution: 20%; Report quality and presentation: 10%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
No formal prerequisite.	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

ARCHE

Semester / TU	**S4 | T.U.18 - Capstone Project in Structural Engineering**	**Module coordinator**	**Hadef Nidhel**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Continuous assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

The aim of this module is to train students in the use of the ARCHE software for the modeling, analysis, and design of reinforced concrete elements and structures. It builds on the knowledge acquired in the strength of materials and reinforced concrete courses and applies them in a professional computing environment.

Module learning outcomes	Indicative content
• Master the interface and basic functionalities of the ARCHE software. • Model simple reinforced concrete elements and structures. Run calculations and interpret the results. • Design the reinforcement of reinforced concrete elements. Generate calculation notes and reinforcement drawings.	• Introduction to ARCHE • Structural Modeling Definition of materials: concrete, • Definition of loads and load • Calculation and analysis of results • Reinforcement design Verification of stresses in concrete • Generation of documents

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation; Software-supported learning.	Modeling and calculation of a simply supported beam.; Modeling and calculation of a planar frame.; Modeling and calculation of a slab on simple supports.; Design of reinforcement for a bending beam.; Design of reinforcement for a compression column.	Continuous Assessment: 100%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
DBAO Reinforced Concrete I & II Design and Calculation of Roads Design and Calculation of Steel Structures Design and Calculation of Civil Engineering Structures Concrete Construction and Structural Building	NF P02-001, NF P02-005 and NF P02-006 standards; G. Calvat, Introduction to Building Drawing; H. Richaud and B. Vuillerme, Reading Building Plans; O. Le Frapper, AutoCAD: From Fundamentals to Detailed Presentation.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Revit Structure

Semester / TU	**S4 | T.U.18 - Capstone Project in Structural Engineering**	**Module coordinator**	**Ben Yahya Nawfel**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Continuous assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module aims to train students in the use of Revit Structure software for creating structural BIM models. It covers the modeling of load-bearing elements, information management, documentation, and interoperability with other structural analysis software. It builds on knowledge acquired in strength of materials, reinforced concrete, and steel construction.

Module learning outcomes	Indicative content
• Master the interface and basic features of Revit Structure. Model structural elements. Use parametric modeling tools. • Manage model information (properties, materials, loads). Create views, sections, and details. Generate schedules and quantity take-offs. • Export models for structural analysis in other software. • Understand the principles of BIM and its application in structural engineering.	• Introduction to Revit Structure • Modeling of Structural • Management of Model • Model Documentation Creation of sheets • Interoperabilit y and Structural

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation; Software-supported learning.	Modeling a simple reinforced concrete structure.; Modeling a simple steel structure.; Creating parametric families.; Generating schedules and drawings.	Continuous Assessment: 100%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
DBAO Reinforced Concrete I & II Design and Calculation of Roads Design and Calculation of Steel Structures Design and Calculation of Civil Engineering Structures Concrete Construction and Structural Building	NF P02-001, NF P02-005 and NF P02-006 standards; G. Calvat, Introduction to Building Drawing; H. Richaud and B. Vuillerme, Reading Building Plans; O. Le Frapper, AutoCAD: From Fundamentals to Detailed Presentation.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

English IV

Semester / TU	**S4 | T.U.18 - Capstone Project in Structural Engineering**	**Module coordinator**	**Rabeb Hamrouni**
Nature / delivery	Transversal | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

• This module presents the last part of the scientific English course. In fact, students need to recognize more sophisticated topics in their field of study such as Designing a dam, and choosing the right nature friendly materials to use in construction. • It focuses more on recycling. It deals with solid waste management.

Module learning outcomes	Indicative content
• Use technical vocabulary related to bridges, dams and sustainable construction materials. • Apply the passive voice and other relevant structures in professional contexts. • Write formal e-mails and structured technical reports. • Communicate civil-engineering information clearly in oral and written form.	• Technical English related to bridges, dams and sustainable construction materials. • Passive voice and other structures used in technical communication. • Formal e-mail writing and professional correspondence. • Structure and language of technical reports. • Technical reading, discussion and oral-presentation tasks.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Interactive language practice and presentations.	Technical-vocabulary, formal-email, report-writing, reading and oral-presentation activities are integrated into class sessions.	Continuous assessment and coursework: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Students must be familiar with different civil engineering vocabulary in English. They have to memorize the soil testing methods names. Moreover, they need to know how to describe building designs, structures, and methods using their own words. Finally, they should use basic English tenses accurately to express themselves.	Cambridge English for Engineering; instructor-provided technical texts on bridges, dams, green materials, formal correspondence and report writing.

Language of instruction: English | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Building Design Office for Reinforced Concrete

Semester / TU	**S5 | T.U.19 - Civil Engineering Design Offices**	**Module coordinator**	**Ahlem Sdiri**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Continuous assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

The general objective of this module is to study the main elements contributing to the resistance of a building structure under the action of permanent, operational, climatic, or seismic loads, acting vertically or horizontally, in relation to architectural design. Emphasis will be placed primarily on the selection and design of reinforced concrete building structures and the sizing of their elements. Structural element analysis will be conducted using appropriate software.

Module learning outcomes	Indicative content
• Propose a design for the framework of a reinforced concrete building. • Calculate the stresses for the various structural elements. • Calculate the reinforcement for the different structural elements.	• Introduction and Review • Actions on Structures • Modeling and Analysis with Calculation • Design of Structural • Construction Layout and Reinforcement

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation; Software-supported learning.	The labs/projects will focus on the complete design and calculation of building structures using software.	Continuous Assessment: 100%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Reinforced Concrete I & II ; Design and Structural Analysis of Buildings	Practice of BAEL 91, J.; Reinforced Concrete; Calculation Guide, J.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Special Foundations Design Office

Semester / TU	**S5 | T.U.19 - Civil Engineering Design Offices**	**Module coordinator**	**Ahlem Sdiri**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Continuous assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module aims to train students in the design and sizing techniques of special foundations, complementing the knowledge acquired on shallow foundations. It covers the various types of deep foundations and soil improvement techniques, taking into account geotechnical, environmental, and economic constraints. The use of geotechnical calculation software will be an essential component of the training.

Module learning outcomes	Indicative content
- Identify shallow and deep foundation systems and select appropriate solutions for geotechnical conditions. - Recognize pile types and principal execution procedures. - Size piles by determining tip resistance and mobilized shaft friction and verify ultimate and serviceability limit states.	• Introduction and Review • Deep Foundations Principle • Soil Improvement Techniques • Soil-Structure Interactions Presentation and Use of Geotechnical • Geotechnical Calculation Software

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation; Case-study analysis; Software-supported learning.	The labs/projects will focus on the complete design and calculation of special foundation systems using software.	Continuous Assessment: 100%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Soil Mechanics II, Reinforced Concrete	NF EN 1997-1 June 2005 Eurocode 7: Geotechnical Design; Foundations and Earthworks, G.; Philipponnat and Bertrand Hubert, Eyrolles 1998.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Road Design Office

Semester / TU	**S5 | T.U.19 - Civil Engineering Design Offices**	**Module coordinator**	**Ahmed Mansri**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Continuous assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

The module applies the concepts from Design and Calculation of Roads to a complete road project, including geometric design, profiles, earthworks, drainage, pavement and technical documentation.

Module learning outcomes	Indicative content
• Draw the longitudinal profile of a road project. - Draw the cross-sectional profile of a road project. - Size the pavement elements.	• Theoretical reminders and supplements. • Traffic studies Design approach • Geometric design transition curves • Pavement design. Objectives and principles of road • Road drainage Evacuation of groundwater

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation; Case-study analysis; Software-supported learning.	The labs/projects will focus on the complete design of a road project using software.	Continuous Assessment: 100%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Soil Mechanics II, Road Design and Calculation, Hydraulic Structures, Design and Calculation of Civil Engineering Structures	Jeuffroy: Design and Construction of Road Pavements, Volume 1 and 2, Eyrolles Editions, 1985.; Dubet: Elementary Road Course, Eyrolles Editions, 196.; Allegret: Course on Road Alignment and Earthworks Design, Eyrolles Editions, 1967, 1959.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Metallic Construction Design Office

Semester / TU	**S5 | T.U.19 - Civil Engineering Design Offices**	**Module coordinator**	**Hadef Nidhel**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Continuous assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

The aim of this module is to train students in the methods and tools used in design offices for the design, calculation, and dimensioning of metallic structures. The focus will be on the application of Eurocodes and the use of structural calculation software.

Module learning outcomes	Indicative content
• Design and calculate an industrial hall with a steel framework.	• Structural Design under Applicable Loads • Purlins and Roof Systems • Truss Design and Calculation • Overhead Cranes and Crane Beams • Columns and Column Bases • Foundation Anchorage • Execution Drawings

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation; Case-study analysis; Software-supported learning.	Study of an industrial framework with an overhead crane: manual calculation and use of the Robot software.	Weightn(%) Continuous Assessment: 100%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Metallic Construction, Structural Calculation, Strength of Materials	Eurocode for Metallic Constructions, EC3, 1996.; Calculation of Metallic Structures According to Eurocode 3, Jean Morel, 1997.; Metal Frameworks: Volume 10 and 11, Manfred A.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Design Office for Reinforced Concrete Reservoirs

Semester / TU	**S5 | T.U.19 - Civil Engineering Design Offices**	**Module coordinator**	**Sonia Ben Mbarek**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Continuous assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

The module is organised around the design and verification of reinforced-concrete reservoirs, including actions, modelling assumptions, hydrostatic loading, wall and slab design, detailing and technical reporting.

Module learning outcomes	Indicative content
• Design a reinforced concrete reservoir by calculating the loads and determining the required reinforcement.	• Theoretical Reminders and Supplements • Actions on reservoirs • Dimensioning of rectangular • Dimensioning of cylindrical • Specific aspects

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation.	Supervised project work leading to documented technical deliverables.; Written report and/or oral presentation, as specified in the module brief.	Continuous Assessment: 100%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Strength of Materials, Reinforced Concrete I and II, Reinforced Concrete Reservoir	Treatise on Reinforced Concrete, Volumes 5 and 6, A. Guerrin, Dunod; Fascicle 74, General Technical Clauses for the Construction of Concrete Reservoirs.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Design Office for Civil Engineering Structures

Semester / TU	**S5 | T.U.19 - Civil Engineering Design Offices**	**Module coordinator**	**Sonia Ben Mbarek**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Continuous assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module focuses on specific methods for the analysis and design of civil engineering structures, with an emphasis on bridges. It covers the study of influence lines, the calculation of moving loads, transverse distribution coefficients, the analysis of deck elements, and the design of bearing devices. The use of structural analysis software will be a key component.

Module learning outcomes	Indicative content
- Design a simply supported post-tensioned prestressed-concrete beam bridge, including preliminary deck sizing, permanent and moving-load analysis, prestressing design and loss calculation. - Model and design bridge structures using ROBOT BAT software.	• Study of longitudinal • Applications on moving • Transverse distribution Influence of the deck geometry and the type of load on the TDC. • Calculation methods for deck elements • Design of bearing

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation; Software-supported learning.	Supervised project work leading to documented technical deliverables.; Written report and/or oral presentation, as specified in the module brief.	Continuous Assessment: 100%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Road Design and Calculation, Design and Calculation of Civil Engineering Structures, Structural Analysis, Reinforced Concrete I & II, Prestressed Concrete	Calgaro: Bridge Design and Construction, 2000. [2] Technical documents by SETRA. [3] SETRA: Designer's Guide to Civil Engineering Structures.; Standard Bridges, 1999. [4] Road Bridges with Adhesion-Prestressed Prefabricated Beams (PRAD); Design Guide, 1996.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Maritime Works

Semester / TU	**S5 | T.U.20 - Civil Engineering Construction: Maritime, Management and Safety Aspects**	**Module coordinator**	**Nihed Kilani**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

The course is composed of 4 chapters as follows: 1- Preliminary studies 2- Study of the site plan 3- Study of the preliminary project (outline design) 4- Study of the detailed preliminary project

Module learning outcomes	Indicative content
• The objective of this module is to define the studies required for a port project and to present and explain the technical verification tools for these studies.	Preliminary studies for a port project; site-plan study; outline/preliminary design study; detailed preliminary design, including the technical verification tools required for port and maritime works.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Port-layout, breakwater, quay, geotechnical and wave-action calculations are integrated into guided applications.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Fluid mechanics Soil mechanics II Hydraulic structures	Booklet 62, Title V (France); Rockfill Guide, 2nd edition, 2009; AFPS 90 Volume 2: Seismic construction rules

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Organization and Management of Construction Projects

Semester / TU	**S5 | T.U.20 - Civil Engineering Construction: Maritime, Management and Safety Aspects**	**Module coordinator**	**Houssin Naieb**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module examines: • the organization of the company and the site in general • project planning using software • The participants: project owner, project manager, design office, etc. • Acquire general, theoretical and practical knowledge concerning the management of projects • • Plan a project according to the fundamental principles of project management • Develop a project results and risks management framework • Define a monitoring/management strategy for a project specific to its context • organizational

Module learning outcomes	Indicative content
• Identify construction-project stakeholders and explain their respective roles. • Explain company, project and construction-site organisation. • Develop schedules, resource plans and monitoring arrangements using project-management principles and MS Project. • Establish risk, results and implementation-monitoring frameworks. • Evaluate project feasibility and performance. • Work effectively in teams and communicate project information professionally.	• Project-management knowledge areas and construction-project organisation. • Company and construction-site organisation. • Roles of the project owner, project manager, design office, contractor and other stakeholders. • Site installation and strategic and organisational planning. • Scheduling, resource planning, implementation and monitoring. • Risk and results management and project-feasibility analysis. • Planning exercises using MS Project.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation; Software-supported learning.	Planning and project-management exercises using Microsoft Project, including activity definition, scheduling, dependencies, resources, progress monitoring and reporting for construction-project applications.	Attendance and participation: 5%; Supervised assessment: 35%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
• Understand the different components of management and project management • Be able to implement techniques, methods and tools to prepare a project or pre-project • Know how to put in place the means to manage the completion of a project	Project analysis techniques, 2nd edition Dunod, 2005; Project planning techniques, 2nd edition Dunid, 1996

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Fire Safety and Fire Resistance of Structures

Semester / TU	**S5 | T.U.20 - Civil Engineering Construction: Maritime, Management and Safety Aspects**	**Module coordinator**	**Nihed Kilani**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1 ECTS | 25 h total (15 h structured + 10 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module focuses on: • Presenting the fundamental concepts specific to the field of fire; • Assessing fire risk; • Demystifying active protections and 'Fire Safety Engineering'; • Providing context for regulations; • Clarifying the behavior of concrete and steel materials during and after a fire.

Module learning outcomes	Indicative content
• Explain the physical principles of fire, combustion, development and propagation. • Assess fire risk and distinguish active and passive protection measures. • Interpret nominal fire curves, reaction-to-fire and fire-resistance classifications. • Apply relevant regulatory and Eurocode concepts to structural fire safety. • Analyse the behaviour of concrete and steel at elevated temperature. • Use a structured methodology to investigate fire causes and circumstances.	• Fire and combustion fundamentals, fire development and flashover. • Nominal fire curves, reaction to fire and fire resistance. • Regulatory framework, European directives and Eurocodes. • Fire risks in existing buildings and active and passive protection. • Compartmentation, human behaviour and heat-transfer mechanisms. • Heat-release rate, ventilation and fire severity. • Mechanical and thermal actions and the behaviour of concrete and steel in fire. • Fire-safety engineering and structured fire-risk assessment.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Fire-curve, heat-transfer, material-behaviour and fire-risk case analyses are integrated into directed-work sessions.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
This module builds on the general knowledge in physics, chemistry, and mathematics acquired during preparatory studies.	A. Van Acker, Fire Resistance of Buildings, 1996; Fire Protection Course for Fire Prevention Officers (ARESU); ANPI technical resources on fire prevention and protection.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Building Pathology

Semester / TU	**S5 | T.U.21 - Structural Performance and Optimization**	**Module coordinator**	**Brahime Hassine**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

The objective of this module is to provide students with the necessary knowledge to understand the causes of disorders and damage in construction, diagnostic methods, and repair and rehabilitation solutions. Emphasis will be placed on analyzing real-life cases and applying theoretical knowledge to practical situations.

Module learning outcomes	Indicative content
• Understand the fundamental physicochemical mechanisms and environmental parameters that govern the durability of concrete and concrete structures. • Know how to choose the appropriate inspection method, whether destructive or non-destructive, for each type of pathology. • Be familiar with the materials and repair techniques to be used for each case of pathology.	• Introduction Introduction Origins of the Different • Foundation Pathologies Origins of the Different • Pathologies of Reinforced • Pathologies of Artistic • Pathologies of Metal

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Diagnosis of defects, inspection evidence, causal analysis and repair-strategy case studies are integrated into guided applications.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Reinforced Concrete I & II, Construction Materials, Soil Mechanics II	[1] NF Standards P02-001, P02-005, P02-006; Introduction to Building Drawing, Gerard Calvat; Guide for the Building Contractor

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Structure Optimization

Semester / TU	**S5 | T.U.21 - Structural Performance and Optimization**	**Module coordinator**	**Hanen Najjar**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

At the end of the module, students should be able to: formulate and choose the appropriate method for solving structural optimization problems.

Module learning outcomes	Indicative content
• By the end of the module, students will be able to : • Identify the different classes of structural optimization involving dimensioning, form and topology, • Explain the concept of design variables, constraints and objective functions in an optimization problem, • Formulate engineering design problems for simple load-bearing structures as optimization problems, • Implement optimization algorithms, • Numerically solve simple structural optimization problems.	Structural optimisation concepts; design variables, objective functions and constraints; mathematical formulation of structural optimisation problems; sizing, shape and topology optimisation; fully stressed design for isostatic structures; numerical optimisation applications.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Formulation and solution of dimensioning, shape and topology-optimisation problems are integrated into tutorial sessions.	Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
RDM I, RDM II, Structural calculation, Opérational research, Numerical Analyses	G. N. Vanderplaats, Numerical Optimization Techniques for Engineering Design, McGraw-Hill, 1985; S. Rao, Engineering Optimization: Theory and Practice, Wiley, 2009; J.-L. Marcelin, Optimisation des structures et d'éléments mécaniques, Eyrolles; G. Allaire, Conception optimale de structures.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Elasto-Plastic Analysis of Structures

Semester / TU	**S5 | T.U.21 - Structural Performance and Optimization**	**Module coordinator**	**Ahlem Sdiri**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module studies material behaviour through the elastic, elasto-plastic and fully plastic phases. It introduces yield criteria, loading-unloading effects, work hardening and rheological models, then applies these concepts to bars, trusses and beams under multiaxial loading.

Module learning outcomes	Indicative content
- Interpret stress-strain behaviour and distinguish elastic, elasto-plastic and fully plastic phases. - Explain and use rheological models representing elasto-plastic material behaviour under multiaxial loading.	• Review of elasticity and stress-strain behaviour. • Elastic, elasto-plastic and fully plastic phases. • Yield criteria, loading-unloading effects and work hardening. • Rheological models, including Kelvin-Voigt and Maxwell models. • Elasto-plastic analysis of bars and composite bars. • Applications to truss structures and beams.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Stress-strain interpretation, rheological-model, bar, truss and beam elasto-plastic analyses are integrated into tutorial sessions.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Solid Mechanics – Finite Elements – Structural Analysis – Engineering Mathematics	M. Blétry, Mechanical Characterization Methods of Materials, Mines Paris; G. Cailletaud and M. Tijani, Mechanics of Solid Materials, Mines ParisTech, 2011; C. Caprani, Plastic Analysis, 2010; J.-J. Marigo, Plasticity and Fracture, École Polytechnique, 2016.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Structural Dynamics

Semester / TU	**S5 | T.U.21 - Structural Performance and Optimization**	**Module coordinator**	**Nessrine Essid**
Nature / delivery	Fundamental | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module introduces the dynamic response of structures. It covers single- and multi-degree-of-freedom systems, natural frequencies and mode shapes, modal and numerical analysis, continuous structures, seismic response and the use of specialised engineering tools.

Module learning outcomes	Indicative content
• By the end of this module, the student will be able to: • Formulate the equations of motion for different types of dynamic structures. • Identify and interpret the natural vibration modes of structures with multiple degrees of freedom. • Use digital tools to analyze structures subjected to dynamic loads, including seismic loads. • Apply theoretical concepts to practical problems in civil and mechanical engineering.	• Equations of motion and response of single-degree-of-freedom systems. • Free and forced vibration in the time and frequency domains. • Natural frequencies and mode shapes of multi-degree-of-freedom systems. • Modal analysis and numerical solution methods. • Continuous structures, including beams and plates. • Introduction to seismic response and spectral analysis. • Application to a real structural case.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Software-supported learning.	Analytical and numerical exercises on SDOF/MDOF systems, modal analysis and seismic response are integrated into tutorials, including a real-case application.	Attendance and participation + Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
A good mastery of the fundamentals of general mechanics (kinematics, solid dynamics), as well as fundamental concepts in material strength and applied mathematics (differential systems).	R. W. Clough and J. Penzien, Dynamics of Structures; A. Filiatrault, Elements of Earthquake Engineering and Structural Dynamics; P. Paultre, Dynamics of Structures Applied to Civil Engineering; A. Pecker, Structural Dynamics.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Tutored Project 4-1

Semester / TU	**S5 | T.U.21 - Structural Performance and Optimization**	**Module coordinator**	**Ahlem Sdiri**
Nature / delivery	Fundamental | Non-presential	**Frequency / duration**	Annually | One semester
ECTS / workload	1 ECTS | 25 h total (15 h structured + 10 h independent)	**Assessment mode**	Project-based assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This tutorial project will involve studying an existing reinforced concrete structure exhibiting pathologies (cracking, reinforcement corrosion, etc.). Students will: Perform a diagnosis of the pathologies using appropriate inspection methods. Model the behavior of the structure, considering the pathologies, using elasto-plastic analysis. Propose repair and strengthening solutions, optimizing technical and economic choices

Module learning outcomes	Indicative content
• Diagnose pathologies affecting a reinforced concrete structure. • Apply elasto-plastic analysis to assess the residual load-bearing capacity of the damaged structure. • Use optimization methods to propose repair and strengthening solutions. • Develop skills in analysis, diagnosis, design of repair solutions, and optimization.	• Structure Selection and Data Collection • Pathology Diagnosis and Impact Assessment • Numerical Modeling and Elasto-Plastic Analysis • Development of Repair and Strengthening Solutions • Optimization of Repair Solutions • Reporting and Presentation

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation.	Supervised project work leading to documented technical deliverables.; Written report and/or oral presentation, as specified in the module brief.	Quality of the diagnosis and analysis: 40%; Relevance and optimization of the proposed solutions: 40%; Quality of the report and presentation: 20%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
No formal prerequisite.	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Cartography and GIS

Semester / TU	**S5 | T.U.22 - Elective Module and Associated Project**	**Module coordinator**	**Ahmed Mansri**
Nature / delivery	Elective | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module introduces students to the fundamental concepts of cartography and GIS, with a focus on their applications in civil engineering. It covers geographic data collection, coordinate systems, spatial databases, spatial analysis tools, and cartographic representation.

Module learning outcomes	Indicative content
• By the end of the module, students will be able to : • Understand the principles of cartography and projection systems. Handle geographic data and spatial databases. • Use spatial analysis tools to solve civil engineering problems. Create thematic maps and relevant visualizations. Master a commonly used GIS software. • Understand the integration of GIS in civil engineering projects.	• Introduction to Cartography • Introduction to Geographic • Acquisition and management • Spatial analysis Surface analysis • Choice of symbols,

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Software-supported learning.	Guided GIS demonstrations and spatial-data exercises using the available GIS software are integrated into application sessions.	Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
No formal prerequisite.	General references on cartography and GIS; user manuals for the selected GIS software (QGIS/ArcGIS as available); scientific publications on GIS applications in civil engineering.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Eco-Design

Semester / TU	**S5 | T.U.22 - Elective Module and Associated Project**	**Module coordinator**	**Farah Mazhoudi**
Nature / delivery	Elective | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	2 ECTS | 50 h total (30 h structured + 20 h independent)	**Assessment mode**	Combined assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module covers the principles and methods of eco-design applied to the field of civil engineering. It includes the life cycle analysis of buildings and infrastructure, the use of eco- friendly materials, energy optimization, resource management, and the reduction of environmental impacts.

Module learning outcomes	Indicative content
• By the end of the module, students will be able to: • Understand the environmental challenges related to the construction sector. Master the principles and tools of eco-design. • Analyze the life cycle of buildings and infrastructure. • Choose eco-friendly and high-performance construction materials. Optimize the energy performance of buildings. Manage resources and reduce construction waste. • Assess the environmental impacts of civil engineering projects. • Integrate sustainable development aspects into project design.	• Introduction to eco • Life Cycle Assessment • Eco-friendly construction materials • Energy optimization of buildings • Resource management and waste

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving.	Life-cycle, material-selection, energy, water, waste and environmental-impact case studies are integrated into application sessions.	Midterm examination: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
No formal prerequisite.	References on sustainable development and eco-construction; environmental standards and regulations; technical guides on life-cycle assessment, energy performance, resource efficiency and low-impact construction.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Topography and Cartography Option Project

Semester / TU	**S5 | T.U.22 - Elective Module and Associated Project**	**Module coordinator**	**Ahmed Mansri**
Nature / delivery	Elective | Non-presential	**Frequency / duration**	Annually | One semester
ECTS / workload	1 ECTS | 25 h total (15 h structured + 10 h independent)	**Assessment mode**	Project-based assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

Students will analyze and propose improvements to the existing road network, considering mobility, environmental impact, and sustainable development. They will: Analyze the existing road network using GIS, including traffic flow, congestion points, and accident hotspots. Propose improvement scenarios (new roads, intersection redesigns, public transport prioritization, bicycle lanes). Evaluate the scenarios using technical, economic, environmental, and social criteria, aided by GIS analysis. Develop a project management plan for the chosen scenario.

Module learning outcomes	Indicative content
• Apply cartographic principles and GIS techniques to solve civil engineering problems. • Develop skills in geographic data collection, management, analysis, and visualization. • Gain proficiency in using a commonly used GIS software (e.g., ArcGIS, QGIS). • Understand the integration of GIS in various civil engineering project phases.	• Project Definition and Data Acquisition • Data Processing and Database Creation • Spatial Analysis and Modeling • Map Creation and Visualization • Report and Presentation

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation; Software-supported learning.	Supervised project work leading to documented technical deliverables.; Written report and/or oral presentation, as specified in the module brief.	Data management and processing: 30%; Application of spatial analysis techniques: 40%; Quality of maps and visualizations: 20%; Report quality and presentation: 10%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
No formal prerequisite.	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Eco-Design Option Project

Semester / TU	**S5 | T.U.22 - Elective Module and Associated Project**	**Module coordinator**	**Farah Mazhoudi**
Nature / delivery	Elective | Non-presential	**Frequency / duration**	Annually | One semester
ECTS / workload	1 ECTS | 25 h total (15 h structured + 10 h independent)	**Assessment mode**	Project-based assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

Students will design a residential building in Gabes, Tunisia, focusing on minimizing its environmental footprint. They will: Select appropriate eco-friendly materials available locally or regionally. Design for energy efficiency, considering passive design strategies and renewable energy integration. Analyze the building's life cycle, from material extraction to end-of-life disposal. Quantify environmental impacts using LCA tools and methodologies.

Module learning outcomes	Indicative content
• Apply eco-design principles to a residential building project. • Conduct a Life Cycle Assessment (LCA) to evaluate environmental impacts. • Optimize energy performance and resource use. • Consider the specific climate and context of Gabes.	• Project Definition and Site Analysis • Material Selection and Design Development • Energy Performance Optimization • Life Cycle Assessment • Reporting and Presentation

Teaching and learning methods	Practical / software / field component	Assessment and completion
Project-based learning; Supervised problem solving; Collaborative or individual project work; Written and oral presentation.	Supervised project work leading to documented technical deliverables.; Written report and/or oral presentation, as specified in the module brief.	Application of eco-design principles: 40%; Quality and completeness of environmental analysis: 30%; Design quality and feasibility: 20%; Report quality and presentation: 10%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
No formal prerequisite.	Learning resources are provided by the module coordinator through ESSAT institutional channels.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Preparation for English B2 Certification

Semester / TU	**S5 | T.U.23 - Human Sciences and Engineering Culture IV**	**Module coordinator**	**Rabeb Hamrouni**
Nature / delivery	Transversal | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1,5 ECTS | 37,5 h total (22,5 h structured + 15 h independent)	**Assessment mode**	Continuous assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

This module prepares students for B2-level English communication and certification. It develops listening, speaking, reading and writing through professional and everyday contexts, with emphasis on register, fluency, vocabulary, grammar and examination strategies.

Module learning outcomes	Indicative content
• Understand the main ideas and relevant detail in B2-level spoken English. • Interact with appropriate fluency and register in professional and everyday situations. • Distinguish formal and informal styles. • Produce coherent paragraphs, letters and e-mails with appropriate grammar and vocabulary. • Apply B2 examination strategies across listening, speaking, reading and writing.	• Cross-cultural communication and question forms. • Present perfect and other B2-level grammar structures. • Telephone communication, information gathering and paraphrasing. • Listening to fluent speech and interacting with appropriate register. • Describing and interpreting data. • Formal and informal styles and persuasive letters and e-mails. • Integrated B2 listening, speaking, reading and writing practice.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Interactive language practice and presentations.	Listening, speaking, reading and writing practice is organised around B2-level tasks, mock tests and corrective feedback.	Continuous assessment and coursework: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Students must have a b1 level in English in order to be able to understand the topics and vocabulary of the B2 level.	Navigate B2 Oxford press

Language of instruction: English | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Labor Law

Semester / TU	**S5 | T.U.23 - Human Sciences and Engineering Culture IV**	**Module coordinator**	**Jihene Jaouadi**
Nature / delivery	Transversal | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1 ECTS | 25 h total (15 h structured + 10 h independent)	**Assessment mode**	Continuous assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

In this module, students will learn about the significance of the employment contract and its characteristics, as well as the rights and obligations of employees and employers, the different types of contracts and leave, and finally, labor litigation (creation of councils, competence, organization and operation, and the procedure of the industrial tribunal).

Module learning outcomes	Indicative content
- Explain the scope, characteristics and principal sources of labour law. - Analyse the employment contract, its validity conditions, parties, main types, leave provisions and termination conditions. - Identify the respective rights and obligations of employees and employers. - Explain the jurisdiction, organisation and procedure of labour/industrial tribunals.	• Explain the rights and obligations of employers and employees • Introduction to employment law • Employment litigation The right to work process

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Case-study analysis.	Employment-contract analysis, legal case studies and application exercises based on Tunisian labour law are integrated into class sessions.	Mid term: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Employment contract (definition and characteristics) , types of contracts , types of vacations , types of licenses , labour tribunal	1-Code de work 1996 Tunisie .; 2-Code de work 2001-2023, Juriste 3-droit du work en Tunisie ,2019, www.tanit jobs.com

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Research Methodology

Semester / TU	**S5 | T.U.23 - Human Sciences and Engineering Culture IV**	**Module coordinator**	**Jihene Jaouadi**
Nature / delivery	Transversal | On-site	**Frequency / duration**	Annually | One semester
ECTS / workload	1 ECTS | 25 h total (15 h structured + 10 h independent)	**Assessment mode**	Continuous assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

-This module aims to allow students to acquire the basic concepts in research methodology necessary both in their academic and professional courses . The'objective is that the'student can be able to carry out a scientific research project. -the aim of this module is to help students practise research methodology when dealing with end-of-year project dissertations: how to set out the problem, the chapters, the sections, the presentation of the cover page . -At the same time, we will be emphasising the technique of communicating with members of the jury during a PFE.

Module learning outcomes	Indicative content
- Use the main terminology of research methodology and formulate a research problem. - Distinguish quantitative and qualitative research approaches and appropriate data-collection methods. - Identify the main stages of a research dissertation or project. - Select basic statistical tools for empirical analysis. - Apply accepted principles for evaluating and reporting scientific work. - Structure and prepare a scientific article or end-of-studies dissertation.	• define the theoretical • research methodology determine the circuit and the steps required for the search • the stages and methods involved • pitfalls to avoid

Teaching and learning methods	Practical / software / field component	Assessment and completion
Interactive lectures; Guided tutorials and problem solving; Case-study analysis.	Literature-search, problem-formulation, method-selection, citation, academic-writing and presentation exercises are integrated into guided workshops.	Mid term: 40%; Final examination: 60%. Completion requires the minimum passing grade under ESSAT regulations.

Prerequisites	Key learning resources
Basic familiarity with academic inquiry, problem formulation, hypotheses and data collection is expected. Students should be prepared to engage in guided research, dissertation/project planning and the use of quantitative or qualitative evidence.	A / Barbara Finlay (2008) : Statistical Methods for the Social Sciences.; 4th Edition.; Prentice Hall.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Technician Internship

Semester / TU	**S6 | T.U.24 - Professional Internships and End-of-Studies Project**	**Module coordinator**	**Direction of Studies and Internships**
Nature / delivery	Fundamental | Non-presential	**Frequency / duration**	Once in the programme | Minimum 4 weeks
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Internship assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

Minimum four-week professional placement. The internship enables students to apply first-year Civil Engineering knowledge in an approved host organisation, observe professional practice, carry out supervised technical tasks, maintain an activity journal and reflect on the competencies developed.

Module learning outcomes	Indicative content
- Apply first-year Civil Engineering knowledge in a supervised professional setting. - Perform basic technical activities in accordance with host-organisation procedures and safety requirements. - Use appropriate basic tools and methods under supervision. - Demonstrate punctuality, teamwork and professional conduct. - Maintain an activity journal and communicate the principal learning outcomes of the placement.	Host-organisation induction and safety rules; supervised technical tasks; application of first-year knowledge; professional communication and teamwork; activity journal; written internship report; supervisor evaluation; oral presentation/discussion.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Work-based learning; Supervised professional practice; Reflective reporting; Academic and professional mentoring; Software-supported learning.	Work-based learning in an approved host organisation under a company supervisor, with ESSAT academic follow-up. Required evidence: internship journal, supervisor evaluation, written report and oral presentation/discussion.	Assessment according to GES-IMP-29 Internship Booklet: meeting deadlines 5%; host supervisor evaluation 20%; consistency of internship project and plan 20%; written report 25%; oral presentation and discussion 30%.

Prerequisites	Key learning resources
All acquired from the 1st year	GES-IMP-29 Internship Booklet; host-organisation procedures and safety rules; relevant technical references and module resources.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

Engineering Internship

Semester / TU	**S6 | T.U.24 - Professional Internships and End-of-Studies Project**	**Module coordinator**	**Direction of Studies and Internships**
Nature / delivery	Fundamental | Non-presential	**Frequency / duration**	Once in the programme | Minimum 4 weeks
ECTS / workload	3 ECTS | 75 h total (45 h structured + 30 h independent)	**Assessment mode**	Internship assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

Minimum four-week professional placement. The internship enables students to apply second-year and advanced Civil Engineering knowledge to supervised engineering assignments, contribute to analysis, design, verification or execution activities, use professional tools and documentation, and demonstrate increasing autonomy and responsibility.

Module learning outcomes	Indicative content
- Apply advanced Civil Engineering knowledge to supervised professional assignments. - Analyse technical situations and contribute to design, verification or execution work. - Use relevant professional tools, software, standards and documentation. - Demonstrate autonomy, teamwork, communication, ethics and safety awareness. - Document and present the engineering work completed during the placement.	Host-organisation induction and safety; supervised engineering tasks; application of advanced technical knowledge and software; professional autonomy and teamwork; technical reporting; supervisor evaluation; oral presentation/discussion.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Work-based learning; Supervised professional practice; Reflective reporting; Academic and professional mentoring; Software-supported learning.	Work-based learning in an approved host organisation under a company supervisor, with ESSAT academic follow-up. Required evidence: internship journal, supervisor evaluation, written technical report and oral presentation/discussion.	Assessment according to GES-IMP-29 Internship Booklet: meeting deadlines 5%; host supervisor evaluation 20%; consistency of internship project and plan 20%; written report 25%; oral presentation and discussion 30%.

Prerequisites	Key learning resources
All acquired from the 2nd year	GES-IMP-29 Internship Booklet; host-organisation procedures and safety rules; applicable engineering standards, software documentation and technical references.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.

End-of-Studies Project

Semester / TU	**S6 | T.U.24 - Professional Internships and End-of-Studies Project**	**Module coordinator**	**Head of Civil Engineering Department**
Nature / delivery	Fundamental | Non-presential	**Frequency / duration**	Once in the programme | Minimum 16 weeks full-time
ECTS / workload	24 ECTS | 600 h total (360 h structured + 240 h independent)	**Assessment mode**	PFE assessment
Previous academic amendment	11 July 2023	**Current academic review**	23 August 2026

Module description

Minimum sixteen-week full-time capstone project. The PFE requires an independently conducted, methodologically sound Civil Engineering task of sufficient complexity for EQF Level 7. The topic is approved before starting, the student is supervised by ESSAT and, where applicable, a host-organisation supervisor, and the work culminates in a dissertation and oral defence before a jury.

Module learning outcomes	Indicative content
- Define a complex Civil Engineering problem and formulate clear objectives. - Review relevant scientific, technical and normative sources and justify an appropriate methodology. - Apply advanced analysis, modelling and design methods. - Verify and validate results and critically discuss alternatives, limitations, safety and sustainability. - Demonstrate independent engineering judgement and a clearly identifiable personal contribution. - Produce and defend a professional academic dissertation.	Topic approval and EQF 7 screening; problem statement; literature and standards review; methodology; data/assumptions and modelling; analysis and design; verification and validation; critical discussion; safety/sustainability considerations; limitations; conclusions; dissertation; plagiarism check; oral defence.

Teaching and learning methods	Practical / software / field component	Assessment and completion
Supervised independent engineering project; Research-based learning; Design and modelling; Critical analysis and validation; Written dissertation and oral defence; Software-supported learning.	Independent supervised engineering project with periodic academic follow-up, advanced modelling/design tools as appropriate, documented verification/validation, dissertation preparation and oral defence. Supervision: ESSAT academic supervisor plus host supervisor where the PFE is conducted externally.	Assessment according to A5-F2 - PFE Assessment Rubric (EQF Level 7). The final weighted score is converted to the ESSAT /20 scale. Methodological rigour, technical analysis/modelling/design, and independence/personal contribution must each meet the minimum EQF 7 standard.

Prerequisites	Key learning resources
Successful completion of the taught Civil Engineering programme requirements and formal approval of the PFE topic under A5-F1.	A5 End-of-Studies Project Framework; A5-F1 PFE Topic Approval and EQF 7 Screening Form; A5-F2 PFE Assessment Rubric; DS-PFE-2018/004 Guide for Writing the Final Project Report; relevant scientific literature, engineering standards and software documentation.

Language of instruction: French, with technical English where relevant | CLO-PLO contribution: see the official CLO-PLO mapping matrix.