BACHELOR OF ENGINEERING IN CIVIL ENGINEERING

Main Language of Instruction:
French ☑ English ○ Arabic ○

Campus Where the Program Is Offered: CST

OBJECTIVES

The Civil Engineering Program aims to train engineers with high scientific and technical expertise in design and construction, equipped to work in civil engineering, building and engineering structures, public works and transportation, water, and environmental sectors. Graduates will have a global and multidisciplinary approach to projects and their management
This program enables graduates to:

- Work effectively and ethically in their professional environment at local, regional, and international levels.
- Advance in their careers to become leaders in their profession, through trilingual skills, continuous learning, and creativity.
- Lead in a dynamic professional environment through continuous education and the development of knowledge and skills.

PROGRAM LEARNING OUTCOMES (COMPETENCIES)

The student outcomes are aligned with the ABET requirements:

- The ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- The ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- The ability to communicate effectively with a range of audiences.
- The ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, considering the impact of engineering solutions in global, economic, environmental, and societal contexts.
- The ability to function effectively on a team, where members provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- The ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- The ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

PROGRAM REQUIREMENTS

180 Credits: Required courses (132 credits), Program concentration courses (42 credits), Institution's elective courses (2 credits), Open elective courses (4 credits).
USJ General Education Program (30 credits – part of the above categories).

USJ General Education Program (30 Cr.)
At least 10 additional credits are earned at the Department of Preparatory Classes
English (4 Cr.)
English level A (4 Cr.)
Arabic (4 Cr.)
Arabic language and culture (2 Cr.)
اللغة العربيّة في الصحافة والإعلان Arabic Language and Media (2 Cr.)
Courses taught in Arabic (2 Cr.)
Building Rules and Regulations (2 Cr.)
Humanities (4 Cr.)
Ethics and Engineering (4 Cr.)

Social sciences (6 Cr.)

Building Rules and Regulations (2 Cr.)
General Economics (2 Cr.)
General and Analytical Accounting (2 Cr.)

Communication techniques (8 Cr.)

Final Year Project (4 Cr. directly linked to communication techniques out of the 16 credits of the course).
Building project: Foundation and Structures (2 Cr. directly linked to communication techniques out of the 6 credits of the course)
Communication (2 Cr.)

Quantitative techniques (4 Cr.)

Statistics (4 Cr.)

Required Courses (132 Cr.)

General Courses (16 Cr.)

Ethics and Engineering (4 Cr). General and Analytical Accounting (2 Cr). General Economics (2 Cr.). Environment and Sustainable Development (2 Cr.). Communication and Work Ready Now (2 Cr.). English (4 Cr.).

Core Engineering Courses (84 Cr.)

Building Rules and Regulations (2 Cr.). Continuum Mechanics (4 Cr.). Construction Materials (6 Cr.). Numerical Analysis (4 Cr.). Strength of Materials (6 Cr.). Fluid Mechanics (6 Cr.). Soil and Rock Mechanics (6 Cr.). Basis of Structural Design - Structural Load Calculations (4 Cr.). General Construction Procedure (4 Cr.). Statistics (4 Cr.). Hydraulics (6 Cr.). Foundation Engineering (6 Cr.). Reinforced Concrete (6 Cr.). Steel and Mixed Structures (6 Cr.). Structures (6 Cr.). Buildings and Frames (4 Cr.). Finite Elements (4 Cr.)

Internships (6 Cr.)

During this program, each student is required to undertake three internships:

One-week training in surveying at the beginning of the third year (2 Cr.), a minimum of 4-week-labor internship at the end of the third year (0 Cr.), a minimum of 8-week-scientific and technical internship at the end of the fourth year (4 Cr.).

Projects (26 Cr.)

During this program, each student is required to complete 3 projects:

- An Architectural Project: This project brings together students from different options within the Department of Civil and Environmental Engineering. Teams of 2 students are formed. The goal is to prepare a building's permit and execution drawings according to appropriate standards and building legislation. (4 Cr.)
- A Multidisciplinary Project: This project brings together students from different concentrations of the Civil Engineering Program. Teams of 2 to 3 students are formed. The goal is to prepare construction drawings of a building according to appropriate standards including structural drawings, foundations design, and more. (6 Cr.)
- A Final Year Project: This project lasts for 4 months. Teams of 3 to 5 students are formed. The goal is to engage students in a real-world design office where they must establish a concept, analyze, and design a civil engineering structure while adhering to specific requirements and constraints. (16 Cr.)

Program Concentration Courses (42 Cr.)

Concentration Buildings and Engineering Management

American Code of Reinforced Concrete (4 Cr.). Building Acoustics (2 Cr.). Building Fire Safety (2 Cr.). Building Lighting and Sanitary (4 Cr.). Building Thermal Design (2 Cr.). Design of Buildings Structures (4 Cr.). Buildings Finance Management (2 Cr.). Market Globalization (2 Cr.). Planning and Management of Large-Scale Projects (4 Cr.). Prestressed Concrete in Buildings (2 Cr.). Quality Management in Buildings (2 Cr.). Rehabilitation and Maintenance of Concrete Structures (4 Cr.). Special Topics in Concrete (2 Cr.). Structural Dynamics and Earthquake Engineering (4 Cr.). Structural Software (2 Cr.)

Concentration Water and Environment

Applied Hydraulics Software (2 Cr.). Dams (4 Cr.). Data Measurement and Acquisition (2 Cr.). Environmental Impact Assessment (2 Cr.). Environmental Law (2 Cr.). Geographic Information Systems (2 Cr.). Groundwater Hydraulics (2 Cr.). Hydrology, (4 Cr.). Irrigation (2 Cr.). Karst Hydrogeology (2 Cr.). Maritime Structures (2 Cr.).

Solid Waste Management (2 Cr.). Statistical Hydrology (4 Cr.). Urban Drainage (2 Cr.). Water Distribution Networks (4 Cr.). Water and Wastewater Treatment (4 Cr.)

Concentration Public Works and Transportation

American Code of Reinforced Concrete (4 Cr.). Dams (4 Cr.). Pavement Engineering (4 Cr.). Plates and Shells (4 Cr.). Prestressed Concrete (4 Cr.). Rehabilitation and Design of Concrete Bridges (4 Cr.). Structures Plastic Behavior (2 Cr.). Shear Strength and Geohazards (4 Cr.). Special Topics in Concrete (2 Cr.). Structural Dynamics and Earthquake Engineering (4 Cr.). Structural Software (2 Cr.). Traffic Engineering (2 Cr.). Transport and Airport Engineering (2 Cr.)

Institution's Elective Civil Engineering Courses (2 Cr.)

One course to be selected from the following list:

Urban and Landscape Planning (2 Cr.). Protection and Aesthetics of Buildings (2 Cr.). Industrial Construction (2 Cr.). Engineering Geology (2 Cr.). Artificial Intelligence in Civil Engineering (2 Cr.)

Open Elective Courses (4 Cr.)

General Education courses that can be pursued in any USJ institution, with at least two credits of Arabic Language or Arabic Culture.

SUGGESTED STUDY PLAN

Semester 1

Code	Course Name	Credits
020PARGS1	Architectural Project	4
020LEBGS1	Building Rules and Regulations	2
020MMDGS1	Continuum Mechanics	4
020ETHGS1	Ethics and Engineering	4
020MAIGS1	Construction Materials	6
020ENVGS1	Environment and Sustainable Development	2
020CGAGS1	General and Analytical Accounting	2
020ECGGS1	General Economics	2
020ANNGS1	Numerical Analysis	4
020STOGS1	Surveying	2
020WRNGS1	Communication and Work Ready Now	2
	Total	**34**

Semester 2

Code	Course Name	Credits
020MEFGS2	Fluid Mechanics	6
020PGCGS2	General Construction Procedures	4
020MESGS2	Soil and Rock Mechanics	6
020STAGS2	Statistics	4
020RDMGS2	Strength of Materials	6
020ACTGS2	Basis of Structural Design - Structural Load Calculations	4
	Arabic Open Elective	2
	Total	**32**

Semester 3

Code	Course Name	Credits
020FOSGS3	Foundation Engineering	6
020HYDGS3	Hydraulics	6
020BEAGS3	Reinforced Concrete	6
020CMMGS3	Steel Structures	6
	Program concentration courses (8 Cr)	
020ACIGS3 020QUAGS3 020GEFGS3	**Concentration Buildings and Engineering Management** American Code of Reinforced Concrete Quality Management in Buildings Buildings Finance Management	 4 2 2
020DEAGS3 020GISGS3 020DREGS3	**Concentration Water and Environment** Water Distribution Networks Geographic Information Systems Environmental Law	 4 2 2
020ACIGS3 020TRAGS3 020AERGS3	**Concentration Public Works and Transportation** American Code of Reinforced Concrete Traffic Engineering Transport and Airport Engineering	 4 2 2
	Total	**32**

Semester 4

Code	Course Name	Credits
020ANGGS4	English	4
020OSBGS4	Buildings and Frames	4
020EFIGS4	Finite Elements	4
020PBAGS4	Multidisciplinary Project: Building Design, Foundations and Structures	6
020STRGS4	Structures	6
	Program concentration courses (6 Cr.)	
020RESGS4 020CTHGS4	**Concentration: Buildings and Engineering Management** Building Lighting and Sanitary Building Thermal Design	 4 2
020IMPGS4 020IRRGS4 020ASSGS4	**Concentration: Water and Environment** Environmental Impact Assessment Irrigation Urban Drainage	 2 2 2
020ROUGS4 020PLSGS4	**Concentration: Public Works and Transportation** Road and Pavement Engineering Structures Plastic Behavior	 4 2
	Restricted Civil Engineering Elective	2
	Open Elective	2
	Total	**34**

Semester 5

Code	Course Name	Credits
020STEGS5	Summer Internship	4
	Program concentration courses (28 Cr.)	
020ACBGS5	**Concentration: Buildings and Engineering Management**	
020SEIGS5	Building Acoustics	2
020COSGS5	Building Fire Safety	2
020MOGGS5	Design of Buildings Structures	4
020PLGGS5	Market Globalization	2
020BPRGS5	Planning and Management of Large-Scale Projects	4
020REMGS5	Prestressed Concrete in Buildings	2
020OSPGS5	Rehabilitation and Maintenance of Concrete Structures	4
020DYSGS5	Special Topics in Concrete	2
020LOCGS5	Structural Dynamics and Earthquake Engineering	4
	Structural Software	2
020LOGGS5	**Concentration: Water and Environment**	
020BAGGS5	Applied Hydraulics Software	2
020MEAGS5	Dams	4
020HSOGS5	Data Measurement and Acquisition	2
020HYDGS5	Groundwater Hydraulics	2
020HKAGS5	Hydrology,	4
020OUMGS5	Karst Hydrogeology	2
020DESGS5	Maritime Structures	2
020HYSGS5	Solid Waste Management	2
020GEPGS5	Statistical Hydrology	4
	Water and Wastewater Treatment	4
020BAGGS5	**Concentration: Public Works and Transportation**	
020PLCGS5	Dams	4
020BEPGS5	Plates and Shells	4
020COCGS5	Prestressed Concrete	4
020RCGGS5	Rehabilitation and Design of Concrete Bridges	4
020OSPGS5	Shear strength and Geohazards	4
020DYSGS5	Special Topics in Concrete	2
020LOCGS5	Structural Dynamics and Earthquake Engineering	4
	Structural Software	2
	Total	**32**

Semester 6

Code	Course Name	Credits
020PBAGS6	**Concentration: Buildings and Engineering Management** Final Year Project FYP	16
020PEAGS6	**Concentration Water and Environment** Final Year Project FYP	16
020PTPGS6	**Concentration: Public Works and Transportation** Final Year Project FYP	16
	Total	**16**

COURSE DESCRIPTION

020ACIGS3 American Code of Reinforced Concrete (ACI) 4 Cr.

This course focuses on the design of reinforced concrete structures according to the American Concrete Institute (ACI) code. Topics covered include: Introduction to ACI - Comparison between European and American codes - Pure tension - Pure compression - Pure bending - Bending plus compression or tension - Shear and torsion.

020LOGGS5 Applied Hydraulics Software 2 Cr.

This course introduces students to the hydraulic aspects and techniques of designing a hydraulic structure. Students will apply theoretical, topographical, hydrological and hydraulic principles in the dimensioning of specific hydraulic structures. Topics covered include: Basic hydraulic principles - Basic hydrology - Culvert hydraulics – Surface water modeling and flood routing using HEC-RAS.

020ARAGS2 Arabic 2 Cr.

Arabic language

020PARGS1 Architectural Project 4 Cr.

This course explains how to conceptualize, design and interpret an architectural project. Topics covered include: Initiation to architectural language - Design of a plan, organization chart, orientation - Proportion of the various elements in architecture - Fixed and mobile furniture – Staircase study – Project launching - Section plan details – Façades
Prerequisites: Computer Assisted Drawing (020DAINI4)

020IAGGS4 Artificial Intelligence in Civil Engineering 2 Cr.

This course introduces students to Machine Learning and Artificial Intelligence, with a focus on deep learning techniques. Topics covered include: Decision Trees - Multilayer Dense Deep Neural Networks - Convolutional Networks - Transformers - Automatic Natural Language Processing - AI Threats - Pytorch.

020ASTGS4 Astronomy 2 Cr.

This course provides students with basic astronomical knowledge to better understand the importance of current and future space discoveries. Topics covered include: Celestial sphere, diurnal movement, planets, ecliptic plane - Tools of modern astronomy - Solar system - The sun - The stars - The interstellar medium - Exo planets - The ultimate states - The galaxy of the Milky Way - Galaxies – Cosmology

020ACBGS5 Building Acoustics 2 Cr.

This course covers sound transmission problems in buildings to enhance quality of life by meeting acoustic comfort standards. Current European regulations are applied to assess and define the acoustic performance of buildings based on their purpose and environmental exposure. Topics covered include: General acoustic concepts - Receiver - Acoustic requirements - Acoustic room correction - Airborne sound insulation - Impact sound insulation - Equipment noise isolation - Acoustic studies.

020OSBGS4 Buildings and Frames 4 Cr.

This course examines the design and dimensioning of the elements of a reinforced concrete building. Topics covered include: Action on the structures (Basic data allowing the study or the verification of a building - Calculation of loads) - Foundations (Generalities - Shallow and deep foundations) - Floors (Methods of computation - Different types of floors - Calculation of reinforced concrete beams - floor slab) - Stairs (Staircase cast in place - Prefabricated staircases - Various types of cast in place stairs).
Prerequisites: Reinforced Concrete (020BEAGS3)

020GEFGS3 Buildings Finance Management 2 Cr.

This course shows precisely what financial management is, how financial decisions can enable the company to achieve shareholder wealth and how they affect the value of the company. It focuses both on decisions related to

the future management of the company and on the acquisition of new assets or new capital. It is about improving the profitability of the company while controlling its risk. Topics covered include: Financial Diagnosis (Prerequisite for any good financial management decision). Introduction to accounting. Financial Approach - The Different Values of the Company - Working Capital and Working Capital Requirements - Ratio Analysis - Cash Flow Analysis - Cash Flow and Budget. Investment Decision. The criteria of choice (certain future).
Prerequisites: General Economics (020ECGGS1) and General and Analytical Accounting (020CGAGS1)

020SEIGS5 Building Fire Safety 2 Cr.

This course covers fire safety in buildings of different types and occupational sizes. Topics covered include: Fire system installation in buildings - Accessibility of buildings by the emergency service (fire trucks) - Insulation from neighboring buildings and third buildings - Interior design of buildings - Fire resistance of structures - Clearances (traffic, door blocks, stairs, etc.) - Interior fittings - Fire characteristics of materials - Natural or mechanical smoke extraction - Emergency means (Detection, Alarm, etc.).

020RESGS4 Building Lighting and Sanitary 4 Cr.

This course provides students with a theoretical and practical overview of the different systems and sanitary facilities. Topics covered include: Project Execution - City water supply - Distribution of cold and hot water in buildings - Water pipes installation - Valves - Wastewater or sewage evacuation - Lighting - Electrical installation.

020LEBGS1 Building Rules and Regulations 2 Cr.

This course aims to teach the students how to develop a building construction project in accordance with building law regulations. Topics covered include: Introduction - The conditions of the inclined land and fences - The conditions of the building permit and conditions of license - Conditions of the housing permit - The roads of the property and the conditions of purchase of these public goods, the envelope of the buildings on the roads identification properties and classification concepts - The safety and public health and architectural aspects - Building rules of high height> 50m - height of buildings and number of floors of independent buildings - Portions of buildings not included in the surface and total operating coefficients: balconies, basements, floors - Parking and number of compulsory cars and alternatives. Incentive of additional and public car parks - Free height under ceiling - Expropriation Act, Act 324-Act.

020CTHGS4 Building Thermal Design 2 Cr.

This course covers all the necessary elements to achieve thermal building design while ensuring the maximum comfort to the user. Topics covered include: Concepts of thermal comfort in the building - Energy in the building in Lebanon - Diagram of the humid air - Thermal balance winter - Envelope of the building and thermal insulation in Lebanon - Heating by forced air - Central heating with hot water - Filtering of the air - Solar hot water production - Heat pump - Summer heat balance - Cold batteries - Air conditioning modes - Ventilation and ducting networks - Bioclimatic houses - Building automation.
Prerequisites: Environment and Sustainable Development (020ENVGS1)

020DAFGS4 Business Law 2 Cr.

This course introduces future engineers to the legal world of business with presentations on budgets.

020ECHGS4 Chess 2 Cr.

Learn Chess - Games - Moves - Strategies - Openings.

020CHCGS4 Climate Change 2 Cr.

This course covers the climatic changes taking place and their influence on the Earth's environment.

020WRNGS1 Communication and Work Ready Now 2 Cr.

This course provides students with the foundational "soft skills", communication skills, and work-based learning experiences to prepare them for success in the workplace. It is designed to facilitate participatory, hands-on teaching and learning. Students will be actively engaged in the learning process and provided opportunities to

practice and enhance new skills and gain the self-confidence necessary to secure and maintain work related to their professional goals. Work-based learning activities are woven into the course and will require students to go to real workplaces in the community outside of class time. Students will be guided to use free online digital tools to demonstrate their learning. Throughout the course, students will create a career portfolio that will help them on their experiential Work Ready Now journey from student to employee.

020MACGS1 Construction Materials 6 Cr.

This course introduces themes that provide a general view of the different categories of engineering materials, their behavior, and teaches students the properties and fields of use of materials in civil engineering. Topics covered include: Chemical bonds between atoms and molecules and periodic table - Elements of crystallography and defects in crystals - Diagrams of equilibrium and transfer and movement of atoms (diffusion of atoms, Fick's law, etc.) - Mechanical properties and modifications of mechanical properties (softening, hardening, refining, etc.) - Degradation of materials and anti-degradation procedures - Composite materials (wood is one of them) - Ceramics (this theme also includes concrete and glass) - Plastics and polymers. Particular attention will be given to Construction materials: Stony materials - Bonding materials - Artificial cements - Mortars - Concrete - Masonry - Metals - Glass – Wood
Prerequisites: General Chemistry (020CHGNI1 or 020CHGCI1)

020MMDGS1 Continuum Mechanics 4 Cr.

This course equips students with the basic tools to describe and model solid and fluid material environments. It provides the essential background needed for specialized courses such as mechanics of materials, fluid mechanics, reinforced concrete, soil and rock mechanics and rheology of materials. Topics covered include: General information on the mechanics of deformable media - Kinematics of deformable media - Dynamics of deformable media - Thermodynamics of deformable media - Calculation methods in linear and isotropic elasticity - Variation principles in solid mechanics
Prerequisites: Statics (020STANI4 or 020STACI4)

020CATGS4 Creative Art Therapy 2 Cr.

This course enables students to become creative in their analysis of specific situations.

020BAGGS5 Dams 4 Cr.

This course provides an analysis of the elements to be considered for the selection and sizing of different types of dams and their appurtenant structures, and compares different solutions technically, economically and environmentally. Topics covered include: Criteria for site selection – Impact of water pressure on the foundations and structures – Safety and imperviousness of dam foundations and body – Design and stability of embankment – Appurtenant structures – Concrete rigid dams – Mobile dams on water courses.

020MEAGS5 Data Measurement and Acquisition 2 Cr.

This course aims to provide an understanding of the operation and use of water-related measurement devices and their associated sensors and electronics. It covers the analysis of the measurement ranges and conditions of use, as well as the supports necessary for data collection. The course also addresses the estimation of measurement precision, data processing, and transformation to present results in units relevant to the measured quantities. Students will learn to design a system and measurement protocol, define criteria for selecting measuring equipment, and explore apparatus typically used for pressurized flows. Topics covered include: Apparatus – Flow velocity measurements on a laboratory and industrial scales - Drinking water and hot water meters - Equipment for modern network management - Sensor, remote transmission and remote control concepts - Surface hydrological measurements - Climatic stations, evaporation - Limnimetry - Flow measurement - Hydrometric station calibration - Data acquisition and processing - Generalities of measurements - Level and displacement measurements - Distance measurements - Force or constraints - Temperature measurements - Pressure measurements - Fluid velocity measurements - Fluid flow measurements - Flowmeter with gyrometer - Definition of the dimension of a meter - Hydraulic and metering properties of a meter - Permissible flow rates.

020COSGS5 Design of Buildings Structures 4 Cr.

This course focuses on the design of structures, an essential phase prior to any calculation. It aims to teach students the techniques of design and analysis of real structures. Topics covered include: Retaining walls - Bearing Walls (Bearings according to DTU-231-1 - Bearings according to Eurocode EC2) - Short consoles (Study of a short console following the BAEL - Study of a short console according to the Eurocode EC2) - Partition beams (Study of partitioned or bended-wall beams, according to the BAEL - Study of a beam according to Eurocode EC2) - Bracing (Introduction - Distribution of forces between the various splits - Design of the braces - Resent with irregularities - Example: mini bracing project) - Reservoirs in the buildings (General - Rectangular tank - Cylindrical tank) - Fire behavior of concrete structures (Area of application - Characteristics of materials as a function of temperature - Distribution of temperature in the concrete - Solicitations and principle of the justifications - Construction rules by categories of works - General method) - Principle of the domes, behavior of slabs of any form (Cupolas - Slabs of some form).
Prerequisites: Buildings and Frames (020OSBGS4)

020EJSGS4 Empowerment Skills for Job Seekers 2 Cr.

This course enhances the skills of job seekers by teaching them how to make a good presentation and write a professional report.

020CDAGS4 Engineering Contracts and Laws of Arbitration 2 Cr.

Topics covered include: The Principles of Contracts - The Law of Arbitration.

020GEIGS4 Engineering Geology 2 Cr.

This course covers an applied geology discipline involving the collection, analysis, and interpretation of geological data necessary for the safe development of civil works. Engineering geology also includes the assessment and mitigation of geologic hazards such earthquakes, landslides, flooding; the assessment of timber harvesting impacts; and groundwater remediation and resource.

020ANGGS4 English 4 Cr.

Students will acquire sufficient language skills in scientific English

020EFEGS4 Entrepreneurship for Engineers 2 Cr.

This course explains the entrepreneurship field for engineers.

020ENVGS1 Environment and Sustainable Development 2 Cr.

This course provides a comprehensive overview of environment and sustainable development, enabling students to assess and analyze major environmental and development challenges facing humanity, and to suggest practical and concrete issues. Topics covered include: State of the Environment - Demography - Mineral Resources - Energy Resources - Water - Solid Waste Treatment - Air Pollution - The Greenhouse Effects - The Ozone Layer.

020IMPGS4 Environmental Impact Assessment 2 Cr.

This course introduces environmental impact assessment (EIA) of projects as a main tool for applying the principle of prevention in the protection of the environment. Topics covered include: General introduction; Overview of the EIA process - Policy, legal and administrative framework; Introduction to course project -

020DREGS3 Environmental Law 2 Cr.

This course familiarizes students with the main environmental, ecological and water scarcity problems as well as the main regulations and laws established to address them. Topics covered include: General - Rights to water usage and consumption: origins, administration and management - Right to water in a Lebanese context - Lebanese waters and Middle Eastern negotiations - Environmental law in Lebanon

020ETHGS1 Ethics and Engineering 4 Cr.

This course aims to teach students the principles of engineering ethics and the relationship between engineers, as well as their relationship with the order of engineers. Topics covered include: Ethics - Morals, deontology – Law - Human rights – Conscience – Freedom - Ethics and spirituality - Ethics and religions - Some current issues in the field of ethics of the person in society: bioethics in the 21st century - Some issues in the field of ethics of society at the service of the person: social, political, economic, entrepreneurial ethics - Relations between engineers - Relations with the order of engineers - Relations in the profession and with administration.

020OREGS4 Event Organization 2 Cr.

This course aims to prepare students in a practical way to face the challenges involved in organizing public events of all kinds. Topics covered include: Define the concept of event - Define the different types of events - Main questions to discuss - The starting point for any event is its purpose - The nature and form of the event - Decide the schedule (date and time) - The choice of place - The organizers. Planning and logistics. The budget - The site or place of the event - The resources - Decoration - Timing - Program - Animation - Restoration - Preparation of all printed material - Reception and reception – Advertising.

020PBAGS6 Final Year Project 16 Cr.

This course enables students to apply their previously acquired knowledge for the study of a real civil engineering project, providing a complete study of a civil engineering work.

020PEAGS6 Final Year Project 16 Cr.

This course enables students to apply their previously acquired knowledge for the study of a real civil engineering project, providing a complete study of a civil engineering work.

020PTPGS6 Final Year Project 16 Cr.

This course enables students to apply their previously acquired knowledge for the study of a real civil engineering project, providing a complete study of a civil engineering work.

020EFIGS4 Finite Elements 4 Cr.

This course aims to practice finite element methods through concrete examples of heat transfer, material strength, and elasticity theory. It provides the necessary elements for students to develop their technical skills and interact effectively with various software. Topics covered include: General information on the finite element method (FEM) - Strong formulation in structural mechanics and heat transfer - Integral or variational formulation - Methods of discretization of the integral form - Discretization by finite elements - Rod element in tension or compression – Bernouilli beam element - Bar elements in thermal transfer - Isoparametric formulation and numerical integration - Two-dimensional finite elements in plane elasticity and thermal transfer - Reference elements and isoparametric formulation - Numerical integration in two dimensions.
Prerequisites: Numerical Analysis (020ANNGS1).

020MEFGS2 Fluid Mechanics 6 Cr.

This course introduces students to the basic principles of fluid statics and dynamics. Topics covered include: Fluid statics – Continuity equation – Momentum equation – Energy equation – Differential formulation of the governing equations - Potential flow theory - Dimensional analysis and similitude – Viscous fluid flow – Introduction to turbulent flow.
Prerequisites: Fluid Kinematics (020CIFNI4) or Introduction to Fluid Mechanics (020IMFCI4) and Calculus 2 (020AN2NI4 or 020AN2CI3)

020FOSGS3 Foundations Engineering 6 Cr.

This course introduces students to the calculation methods and rules of the art in the field of design and construction of foundations and retaining structures. Topics covered include: Identify the mechanical and hydraulic properties of soils. Understand the principles of geotechnical investigation as well as the main field tests. Dimension conventional superficial foundations. Understand the principles of thrust and thrust, and apply

them to the calculation of retaining walls and different types of walls. Design the piles. Geotechnical Design – Reminder: Geotechnical Properties - Site Investigation and Exploration - In Situ Testing - Superficial Foundations – Active and Passive Pressures - Retaining Structures - Excavations and Groundwater Control - Deep Foundations. **Prerequisites:** Soil and Rock Mechanics (020MESGS2)

020EREGS2 From Engineering to real Estate Development 2 Cr.

Topics covered include: The Real Estate field. The relation between engineering and real estate.

020FQSRS4 Fundamental Questions about Science and Religion 2 Cr.

The course offers overviews of major scientific and mathematical theories: Chaos Theory, Quantum Mechanics, Heisenberg's Uncertainty Principle, String Theory, General Relativity, Cosmology, Black Holes, Gödel theorem, Information theory, and set theory. In a second section, it proposes a dialogue on fundamental questions: Miracles and science; Evolution; Religious pluralism; Ethics, science, and theology; what can and cannot be said about God based on science and religions, Mathematical, metaphysical and divine infinity. Other topics that will be discussed interjectionally: God's goodness, omniscience, and omnipotence versus evil and natural disasters; Beauty, scientific truth, and God; The existence of God.

020CGAGS1 General and Analytical Accounting 2 Cr.

This course familiarizes students with the different accounting documents, enabling them to establish the profit and loss accounts and the balance sheets. Moreover, they will determine the breakeven point as well as the distribution of expenses in fixed and variable. They will be able to draw up projected budgets and analyze the gaps with actual results. Finally, students will have in-depth knowledge of the different external stakeholders in the life of the company. Topics covered include: GENERAL ACCOUNTING: Standard documents (invoices, payment method, effect checks, etc.) - Balance sheet accounts - Income statement account - Elisa case (accounts in Te, income statement, balance sheet) - Case Crêperie Bretonne (recipe table, expenses, depreciation) - Case Pierre Berthoin (balance sheet and profit and loss account), profitability compared to turnover and capital - Case Segot Printing (sale of assets, relocation, provision). ANALYTICAL ACCOUNTING: Neutral (fresh fixed and variable allocation) - Motorex case (operating table showing margin on variable expenses and profit) - SAPAG case (estimated budget and gap analysis). EXTERNAL STAKEHOLDERS: The State - The Bank - The Stock Exchange - Special financing (BOT, Concession, Syndic loans, ...).

020PGCGS2 General Construction Procedures 4 Cr.

This course covers the main problems related to the execution of building construction projects. Topics covered include: Technical, financial and administrative analysis of the bidding documents - Management of projects in progress - Specifications and implementation techniques for civil engineering works from concrete to finishes - Construction machinery - Concrete components.

020ECGGS1 General Economics 2 Cr.

This course aims to provide students with the necessary notions of microeconomics, focusing on the branch of the economy that analyzes economic behavior at the level of individual entities such as a consumer or a company.

020GISGS3 Geographic Information Systems (GIS) 2 Cr.

The course introduces the possibilities of using GIS in the field of civil engineering, especially in the hydraulic and hydrology fields. It introduces the basic concepts of GIS: how to create, integrate and update geo-referenced data in vector and matrix modes; It introduces the spatial analysis principles applied to GIS, including tabular data querying, spatial queries, and layout and presentation functions.

020GRDGS4 Graphic Design 2 Cr.

This course covers the essentials of graphic design.

020HSOGS5 Groundwater Hydraulics 2 Cr.

This course provides the necessary elements to: quantify the groundwater flow in confined and unconfined aquifers; estimate the rates of seepage under dam structures; design and dimensioning of drills; interpret pumping tests; quantify solute and pollutant transport in simple configurations. Topics covered include: Introduction - Darcy's law - Groundwater flow - Groundwater flow modeling - Field drilling methods - Pumping well hydraulics - Pollutant transport - Case study.

020HYDGS3 Hydraulics 6 Cr.

This course focuses on steady-state and transient flows that include the design of simple and complex water distribution networks. Extended network analysis is undertaken by studying pumps and turbines. Free-surface flows complement the various flow aspects a civil engineer may encounter in practice. In addition to technical aspects, economic aspects are considered through various optimization methods. Topics covered include: Steady-State and Pressurized Networks – Turbomachines – Free surface flow - Unsteady Network Conditions in Pressurized Pipes - Network protection from water hammer effects - Network Economic Study and Optimization - Laboratory Experiments.
Prerequisites: Fluid Mechanics (020MEFGS2)

020HYDGS5 Hydrology 4 Cr.

This course is divided into two parts: climatology and hydrology. Climatology deals with the atmospheric mechanisms as well as qualitative and quantitative climate parameters. Hydrology is a fairly large field that covers measurements of a significant number of hydrological variables, as well as the analysis and quantification of terms related to conservation principles. Also, this part deals with extreme events and sheds light on hydrological modeling. Topics covered include: Introduction to climatology and hydrology - Principles of Meteorology - – Hydrologic Measurements – Rainfall Analysis – Watershed Delineation – Infiltration – Evaporation and Transpiration - Hydrographs – Flood Routing – Short Overview on Modeling – Laboratory Experiments: Hydrological bench – Permeability bench – Coagulation, flocculation and decantation bench.
Prerequisites: Hydraulics (020HYDGS3)

020INDGS4 Industrial Construction 2 Cr.

The course consists of an interactive platform where the participation of students is continuous. It is enriched with examples supported by recent and less recent photos, short films and presentations, which reinforce theoretical notions already acquired. It also introduces a new dimension to the student engineer's approach to designing and executing a construction. Topics covered include: Introduction to the industrialization of concrete construction and prefabrication - Architectural design of a prefabricated construction - Structural design of a prefabricated construction plus annex: how to avoid the behavior in a castle of card during an explosion occurred in a building prefabricated) - Prefabrication methods - Joints between prefabricated components - Transport of prefabricated components - Assembly of prefabricated components - Components of prefabricated facades - Components of prefabricated floors - Examples of prefabrication systems - Example of a handling system - Introduction to prefabrication steel - Example of a component of the building industry: plasterboard is a revolution in the design of partitions.

020AINGS4 Interior Architecture 2 Cr.

This course allows to approach the interior project through the following work methodology: selection of a theme, study the set of architectural movements that are most related to this theme and finally reach a materialization of a concept. Topics covered include: Exhibition and discussion of some projects that meet the course objectives - Exhibition of different themes and architectural movements - Choice of a relevant theme by each student and launching of the final project - Projection of some interior and exterior projects where the indoors / outdoors contrast is highlighted – Pin-ups and presentations- Final rendering of an A3 portfolio - Discussion and projection of the class' best projects.

020IMAGS Introduction to Marketing 2 Cr.

This course introduces the students to basic principles of marketing.

020IRRGS4 Irrigation 2 Cr.

This course aims to teach students about the importance of irrigation, plant behavior and irrigation practices. Topics covered include: Review of water cycle and importance of irrigation systems - Types of irrigation systems and machinery - Evapotranspiration and plants - Sprinkler irrigation - Irrigation and drainage - Irrigation in a Lebanese context.

020HKAGS5 Karst Hydrogeology 2 Cr.

This course is about karst nomenclature and definitions, basic concepts for understanding karst development and related groundwater flows. Topics covered include: Introduction to methods in karst hydrogeology and geotechnical problems related to karst - Introduction to karst geology and geological notions - Introduction to methods in karst hydrogeology including hydrological, hydraulic, hydrochemical and isotopic/tracer methods - Karst hydrogeology of Lebanon - Introduction to groundwater modeling in karst environments.

020MOGGS5 Market Globalization 2 Cr.

This course is divided into two parts and is intended for non-managers. It introduces basics of negotiation, especially through practical case studies and role plays to allow students better understand the subtleties and problems they will face in their professional lives. Topics covered include: Business Negotiations - Interpersonal communication - What is meant by negotiation - The method of business negotiations - The strategies for conducting a negotiation. Introduction to globalization. The international environment - The institutional framework of international exchanges - Globalization and new technologies - The international strategy of the company.

020OUMGS5 Maritime Structures 2 Cr.

This course equips students with the basic elements to assess and analyze the seawater effects on the constituent elements of a port or a maritime structure. Topics covered include: Wave theory - Physico-chemical properties of seawater - Action of the sea on building materials - Principles of setting up a seaport - External works of the ports - Inner works of the ports - Docking works - Tools of the maritime ports - Clearance of the channels of access of the ports and the water bodies. Dredging-Drills; Bailout wreck.
Prerequisites: Foundation Engineering (020FOSGS3)

020PBAGS4 Multidisciplinary Project: Building Design, Foundations and Structures 6 Cr.

This course covers the design of foundations and structural elements of reinforced concrete building. Topics covered include: Calculation of the foundations of a building - Calculation of the structure and dimensioning of the structural elements of a reinforced concrete building.
Prerequisites: Reinforced Concrete (020BEAGS3) and Architecture Project (020PARGS1)

020ANNGS1 Numerical Analysis 4 Cr.

This course aims at providing students with the numerical tools and computational techniques to solve the equations and models encountered in the field of Civil Engineering. Topics covered include: General introduction to numerical methods - Approximation and interpolation - Numerical integration - Numerical derivation - Numerical resolution of differential equations - Systems of linear equations - Equations and systems of nonlinear equations - Methods of calculating eigenvalues- Partial derivative equations.
Prerequisites: Calculus 2 (020AN2NI4 or 020AN2CI3), and Bilinear Algebra and Geometry (020ALBNI3) or Algebra 2 (020AL2CI3)

020PLGGS5 Planning and Management of Large-Scale Projects 4 Cr.

This course aims to introduce students to the concepts of project management, the content of the contractual management documents, as well as the methodology for preparing a complete set of tender documents. Topics covered include: General introduction - Administrative management - Quality management - Cost management - Time management - Presentation and discussion of student projects - What is a project - What is planning a project - How to develop a project - Running the schedule - Target and progress - Allocation of resources and costs - Layouts and fitters.

020PLCGS5 Plates and Shells 4 Cr.

This course covers the theoretical elements needed to pre-dimension and analyze structural elements such as slabs, walls, roof, tanks and folded structures. Topics covered include: General introduction on plates and shells - Kirchhoff's theory of plates - Bending theory of rectangular plates - Bending theory of circular plates - Theory of shells - Membrane theory of shells of revolution - Bending theory of shells of revolution - Junction of shells of revolution.
Prerequisites: Structures (020STRGS4)

020BPRGS5 Prestressed Concrete in Buildings 2 Cr.

This course covers the basic principles of the behavior of prestressed concrete structures with a focus on building applications. Topics covered include: Definition - Concept - History - Advantages - Materials (Concrete, Steels) - Processes and systems – Pre-stressing losses - Principles of calculation.
Prerequisites: Reinforced Concrete (020BEAGS3)

020BEPGS5 Prestressed Concrete 4 Cr.

This course provides the necessary elements to understand and design the Prestressed Concrete Structure. Topics covered include: Historical View of Prestressed Concrete - Different Procedures of Prestressed - Losses Calculation of Prestressed cables - Flexure in Service and Ultimate Design of Prestressed Concrete - Shear Design - Material characteristically and behavior - Composite Beams design - Hyperstatical system: Continuous beams and Post-Tensioning bridges exercises.
Prerequisites: Reinforced Concrete (020BEAGS3)

020PUBGS4 Public Speaking 2 Cr.

This course aims to enhance the knowledge of students in the field of Public Speaking through real cases and examples.

020PECGS4 Protection and Aesthetics of Buildings 2 Cr.

This course addresses the protection and aesthetic aspects of constructions, especially paints, sealing problems, and more. Topics covered include: The elements of mixing water and their influence on buildings - Admixtures - Cemented products - Protective products and applications - Aesthetics (Painting and decorative products) - Plastic products (electrical - heating - expansion joints ...)

020QUAGS3 Quality Management in Buildings 2 Cr.

This course introduces students to quality in management systems and particularly in the field of construction where risk, safety and economic issues are important. Topics covered include: Introduction - Quality management systems - Quality assurance in construction (ISO, ...) - Codes and standards - European requirements (especially construction products) - Quality chain in the construction industry - Technical inspection - Procedures and quality manual - Economic and technical impact of non-quality - Statistics - Site visit - The necessary improvement of quality in the construction industry - Prevention / correction - Building pathologies - Practical examples - Real cases.

020COCGS5 Rehabilitation and Design of Concrete Bridges 4 Cr.

The course provides the necessary information for designing the various types of bridges. It examines the causes of disorders of existing bridges and the techniques used for their repair and reinforcement. Topics covered include: Generalities -Functional data - Bridge equipment -Traffic load calculations - Distribution of horizontal forces on supports - Piers and abutments - Steel bridges -Reinforced and prestressed concrete bridges - Precast prestressed concrete bridges - Girder bridges - Suspension bridges - Cantilever bridges - Rehabilitation and reinforcement of concrete bridges - Bridge monitoring and maintenance
Prerequisites: Structures (020STRGS4)

020REMGS5 Rehabilitation and Maintenance of Concrete Structures 4 Cr.

This course provides the necessary baggage for the establishment of a rehabilitation operation or transformation of the building structure by the various investigation and consolidation processes with the development of

cases of completed projects. Topics covered include: Introduction: Maintenance - Rehabilitation - Modification- Reinforcement - Choice of policy to follow: cost-Internet - Nature and type of building (Historic building in masonry - Old building: masonry + concrete - Building in reinforced concrete - Building in steel structure) - Processes and phases to follow (Diagnosis - Rehabilitation Project) - Development of completed projects.

020BEAGS3 Reinforced Concrete 6 Cr.

This course consists of dimensioning reinforced concrete structural elements according to BAEL and Eurocode 2. Topics covered include: Introduction - General - Bases of semi-probabilistic calculation - Evolution of calculation methods for reinforced concrete - Characteristics of materials - Durability and Coating - Adherence - Constructive provisions - Theory of cracking - Simple traction - Study of columns - Simple compression - Composite bending - Study of beams - Simple bending - Shear force - Study of beams - Torsion - Seismic arrangements - Practical work: Strength of concrete (Mechanical compression - Sclerometer - Pundit) - Test Los Angeles - Determination of concrete - Cleanliness of sand ...
Prerequisites: Strength of Materials (020RDMGS2)

020ROUGS4 Road and Pavement Engineering 4 Cr.

This course explains how to draw a road and design its roadways. Topics covered include: Vehicle movement - Plan drawing - Longitudinal profile - Cross section - Road equipment - Safety devices - Signing - Night traffic, lighting - Drainage devices, drainage - City roads - Crossroads - Calculation of curvatures - Initiation to the layout on computer. - Road geotechnics - Surface qualities of pavement - Pavement design, calculation of thicknesses - Basic materials - Aggregates - Binders - Surface layers, asphalt mix - Road construction - Pavements - Superficial coatings - Rigid pavements, cement concrete pavements. - CBR test - Softening test - Penetration test - Ductility test - Accelerated polishing test and friction pendulum.

020RCGGS5 Shear Strength and Geohazards 4 Cr.

Key topics include: Understand influence factors and plan the measurement of soil shear strength under static and cyclic loading modes; Understand the basis of soil rheology; Introduce the notions of the effect of earthquakes on soils in terms of failure mode; Analyze landslide problems in terms of slope stability, excavations and embankments. Apply geotechnics to environmental problems; Identify the nature of contaminants in the soil with their biological, chemical and physical properties; Understand the modes of transport of contaminants in order to calculate their concentration in time and space; Develop treatment methods for soil decontamination; Design landfills. Recall of stress theory and failure criteria - Evaluation of shear strength - Shear strength of powdery soils - Shear strength of cohesive soils - Resistance to cyclic shear - Effect of earthquakes - Importance of landslide problems - Slope stability: Stability calculation and reinforcement methods - General introduction to geo-environment - Basics of understanding soil behavior in environmental geotechnics - Contaminants and contamination in environmental geotechnics - Transport of contaminants in soils - The recognition and investigation of polluted sites - Design of landfills - Restoration of contaminated sites.
Prerequisites: Foundation Engineering (020FOSGS3)

020MESGS2 Soil and Rock Mechanics 6 Cr.

Key topics include: Understand the behavior of the soil material. Identify the physical properties, the mineralogical and chemical composition of the porous medium. Understand the theory of soil compaction. Introduce the notions of interstitial pressure and effective stress. Identify the hydraulic properties of soils. Draw the water flow networks. Understand consolidation and calculate soil compaction. Understand the Mohr-Coulomb criterion. Introduce the concepts of shear resistance and geo-environment. General and Geological Recall - Soil Classification Properties and Indexes - Soil Classification - Clay Minerals and Soil Structure - Compaction and Road Geotechnics - Capillarity, Removal, Swelling, Frost Action - Water in Soils: Permeability and Networks flow - Consolidation and settlement - Consolidation velocity - Mohr-Coulomb criterion and Shear resistance - Geo-environmental concepts.
Prerequisites: Geology (020GELNI4 or 020GELCI4)

020DESGS5 Solid Waste Management 2 Cr.

This course addresses municipal solid waste problems and treatment methods. Topics covered include: Sources, quantities generated and properties of municipal solid waste - Municipal waste collection techniques - Public road cleaning techniques - Municipal waste disposal techniques: landfilling and incineration - Waste recycling

and re-usage (composting, glass/plastic/paper re-use, etc…) - Waste disposal costs - Industrial and medical waste collection and treatment.

020OSPGS5 Special Topics in Concrete 2 Cr.

This course covers the design of special concrete structures including: Short consoles - Beams partitions - Mixed structures - Walls of resurfacing - Water tanks - Cap - Industrial chimneys - Silos - Floors - Slabs – Cylindrical shells - Caissons.
Prerequisites: Reinforced Concrete (020BEAGS3)

020HYSGS5 Statistical Hydrology 4 Cr.

This course provides the necessary elements to: determine and fit probability distributions and models to univariate and multivariate hydrologic variables, perform statistical tests and frequency analysis, select extreme value distributions and estimate probable maximum or minimum events (precipitation, droughts and floods). Topics covered include: Statistical analysis of hydrological data - Graphical representation of data - Extreme values of a variable -Correlatory analysis - Simple regression and multiple regression - Statistical tests in hydrology - Statistical study of rainfall - Frequency analysis - Example of statistical model in hydrology.
Prerequisites: Statistics (020STAGS2)

020STAGS2 Statistics 4 Cr.

This course introduces students to basic statistics. Topics covered include: Central limit theorem - sampling distributions - qualities of the estimators - Estimation by confidence intervals - estimation by the maximum likelihood method - estimation by the moments method - tests of parametric hypotheses - Linear regression (simple and multiple) - tests of non-parametric hypotheses - bootstrap - introduction to Bayesian statistics - Monte Carlo method - Monte-Carlo methods by Markov chains (MCMC) - approximate Bayesian calculation (ABC).
Prerequisites: Probability (020PRBNI4) or Algebra 3 (020AL3CI4)

020CMMGS3 Steel Structures 6 Cr.

Metallic and mixed construction is one of the most widespread and expanding construction methods in Lebanon. The objective of this course is to design and dimension the structural elements of a building or a metal or mixed structure according to CM66 and Eurocodes 3 and 4 regulations. Topics covered include: General overview-Components of a metal building structure - Poles - Farms and beams - Floors - Framing walls and partitions - Cover - Connections – Applications. Calculation and sizing. Regulation aspect CM66, EC3 and EC4 - Calculation of solid core and truss posts. Buckling. Calculation of solid core and truss beams – Spill. Calculation of overhead cranes and monorails - Calculation of a roof failure. Calculation of rails - Calculation of joints; bolting, welding - Study of bracing - Study of an industrial building or a residential building.
Prerequisites: Strength of Materials (020RDMGS2)

020RDMGS2 Strength of Materials 6 Cr.

This course enables students to understand the behavioral law of the materials, calculate and analyze the characteristics of the cross sections, as well as distribute the internal efforts and stresses in the different elements of 2D structures and the deformations of these elements. Topics covered: Theory of beams – Characteristics of the cross section - Center of Gravity - Moment of inertia – Normal effort - Bending - Torsion - Shear – Combined loadings - Calculation of the critical load of a structure: Theory of Euler - Energy theorems: Clapeyron, Maxwell-Betti, Bertrand de Fonviolant, virtual works, Castigliano, Menabrea - Force method - Three moments method.
Prerequisites: Continuum Mechanics (020MMDGS1)

020DYSGS5 Structural Dynamics and Earthquake Engineering 4 Cr.

This course equips students with the necessary elements to understand the dynamics of the structures and size them to withstand earthquakes according to the PS92 regulation. Topics covered include: Earthquakes - Single Oscillator - Multiple Oscillator - Response of a structure to an earthquake - Calculation from an accelerogram - Calculation from a response spectrum - Regulatory aspects - Structural modeling - Seismic design - Rules PS92: Design, calculation and construction - Applications - Study of some works according to PS92.
Prerequisites: Waves Physics (020PHONI3)

020STRGS4 Structures 6 Cr.

This course covers structural forms; influence lines; effects of temperature loads on structures, analysis of arches, trusses, continuous beams, 2D frames, grids and 3D frames. Topics covered include: Calculation of 2D structures (Rotation Method and Hardy-Cross Method) - Study of Arcs - Study of 3D structures - Method of displacements - Study of the stability of structures - Study of influence, use of lines of influence and applications - Beams on elastic supports - Beams on elastic soil - Study of the effect of temperature on structures – Software applications.
Prerequisites: Strength of Materials (020RDMGS2)

020PLSGS4 Structures Plastic Behavior 2 Cr.

This course equips students with the basic elements of plasticity, currently used in the new calculation codes in civil engineering. Topics covered include: Generalities on plasticity calculation and plasticity criteria, Plastic traction and Compression, Plane plastic bending and notion of plastic hinge, Plastic resistance of sections in the presence of interaction between the internal forces - Calculation of the collapse load of statically indeterminate structures: Using the step-by-step method, Using the theorems of limit analysis.
Prerequisites: Strength of Materials (020RDMGS2)

020ACTGS2 Structural Load Calculations 4 Cr.

This course aims to study and analyze the basis of structural design including the evaluation and analysis of vertical loads, snow and wind on structures as well as the appropriate consideration of different combinations of actions. Topics covered include: Introduction - Verification by the partial factor method - Serviceability and Ultimate limit states - Classification of Actions - Combination of Actions - Snow load - Wind load.

020LOCGS5 Structural Software 2 Cr.

This course presents the modeling and calculation of structures by finite elements using software: Robot Autodesk, ETABS, SAFE, CSI bridge. Topics covered include: Study of plane and spatial portal frames, Study of plates and shells, Study of a bridge, Seismic analysis of a building founded on a general raft.

020STEGS5 Summer Internship 4 Cr.

Students will undertake their first work experience in a professional environment, namely design offices and construction sites. This internship lasts 8 weeks.

020STOGS1 Surveying 2 Cr.

This course covers the use of topographic material for field surveys, and the operation of topographic equipment: tachometer, theodolite, level, prism square, workstation.
Prerequisites: Topography (020TOGNI4)

020TRAGS3 Traffic Engineering 2 Cr.

Students will study and analyze the road traffic of a region, and the different elements and functions of a road or highway. Topics covered include: The different elements and functions of a road or highway - Road traffic - Transport demand and supply - Economic and institutional context - Comparison of modes of transport - Priority to public transport in large cities - Environmental impacts.

020AERGS3 Transport and Airport Engineering 2 Cr.

This course provides students with a systematic approach to essential structures in airport design. It addresses all the necessary topics or a civil engineer can intervene for a better exploitation, that it is at the level of the airport platforms or within the airline companies. At the end of this course, students will be able to sizing an aerodrome or undertaking its execution. On the other hand, they will also be familiar with aviation operations. Topics covered include: Airport Panorama - Aerodrome Information - Physical Characteristics of the Track and Traffic Tracks - Aeronautical Clearances - Aeronautical Pavements - Freight Stations - Hangars and Specialized Areas - Control Towers and Technical Blocks - Radio and Meteorological Aids - Beaconing of the Day and Lighting Signage - Traffic - Drainage - Maintenance of the Airfield - Visit Beirut International Airport.

020AVTGS4 Urban and Landscape Planning 2 Cr.

This course covers urban planning rules.

020ASSGS4 Urban Drainage 2 Cr.

This course covers the design of urban sanitation networks. Topics covered include: Survey of urban planning (Topographic - Cadastral - Geological - Climatic) - Rainwater (Watershed - Statistical study of precipitation - Impoundment, Storm weirs) - Abacuses and formulas - Wastewater (Analysis - Curve of flow, tips - Evacuation: study of networks - Longitudinal profiles - Drawing in plan - Obstacles - Structures) - Symbols, Written documents.
Prerequisites: Hydraulics (020HYDGS3)

020GEPGS5 Water and Wastewater Treatment 4 Cr.

This course examines the methods of water and wastewater treatment. Topics covered include: Water: Characteristics, constituents, impurities - Types of water to be treated and why - Physico-chemical processes for water treatment - Biological processes for water treatment – Sludge - Potable water treatment streams – Typical treatment plants - Waste water treatment streams – Typical treatment plants.

020DEAGS3 Water Distribution Networks 4 Cr.

This course introduces the water management process, focusing on the relationship between natural water and water treatment. It provides essential information for modeling, dimensioning, scenario simulation and the choice of equipment needed to provide citizens with sufficient water and adequate pressure. Topics covered include: Water transport cycles - Estimation of the populations to be served - Volumes and flows of drinking water - Collection, supply and distribution of water - Flows needed to fight fires - Existing pipes on the market - Accessory organs - Stops and fasteners - Hydraulic characteristics of flows in water distribution pipes - Design and modeling of a drinking water distribution network - Water distribution for irrigation projects.