



FACULTY OF ENGINEERING



DEPARTMENT OF CIVIL ENGINEERING

Bachelor of Science (BS) Degree – 109 Credits

Sem	Course Code	Course Title	Credit	Pre-Req	Co-Req
1	CIVE 201	Statics	3		
1	CSIS 206	Principles of Programming	3		
1	ENGL 203	English Communication Skills III	3		
1	MATH 200	Calculus I	3		
1	MATH 211	Linear Algebra I	3		
1		Elective 1	3		
Sem	Course Code	Course Title	Credit	Pre-Req	Co-Req
2	CIVE 202	Mechanics of Materials	3	CIVE 201	
2	CIVE 203	Engineering Drawing I	1		
2	ENGL 2XX	English Elective	3	ENGL 203	
2	CIVE 290	Introduction to the Engineering Design Process	1		
2	MATH 202	Calculus II	3	MATH 200	
2	MATH 270	Differential Equations	3	MATH 200	
2		Elective 2	3		
Sem	Course Code	Course Title	Credit	Pre-Req	Co-Req
3	CIVE 204	Construction Materials and Methods	3	CIVE 202	
3	CIVE 205	Theory of Structures I	3	CIVE 202	
3	CIVE 206	Engineering Drawing II	1	CIVE 203	
3	CIVE 310	Building Laws	2	CIVE 203	
3	GENG 221	Engineering Ethics	3	CIVE 290 ENGL 203	
3	MATH 230	Numerical Analysis I	3	MATH 200 CSIS 206	
3	MATH 246	Probability For Engineers	3	MATH 200	
Sem	Course Code	Course Title	Credit	Pre-Req	Co-Req
4	CIVE 208	Surveying	2	MATH 200	CIVE 214
4	CIVE 209	Reinforced Concrete I	3	CIVE 205	
4	CIVE 210	Strength of Materials Laboratory	1	CIVE 204	CIVE 209

4	CIVE 214	Surveying Laboratory	1	CIVE 203	CIVE 208
4	CIVE 243	Fluid Mechanics Laboratory	1		MECH 243
4	CIVE 301	Soil Mechanics	3		CIVE 209
4	GENG 222	Sustainable Development for Engineers	3	CIVE 290 ENGL 203	
4	LISP 200	Information Skills and Search Techniques	1		ENGL102
4	MECH 243	Fluid Mechanics	3		
Sem	Course Code	Course Title	Credit	Pre-Req	Co-Req
5	CIVE 303	Computer-Aided Design	1		CIVE 304
5	CIVE 304	Reinforced Concrete II	3	CIVE 209	
5	CIVE 306	Soil Mechanics Laboratory	1		CIVE 301
5	CIVE 309	Engineering Economy	3	MATH 200	
5	CIVE 312	Construction Management Fundamentals	2	CIVE 206 CIVE 209	
5	CIVE 316	Construction Management Modeling	1	CIVE 209	CIVE 312
5	CIVE 324	Structural Steel Design	3	CIVE 205	
5	CIVE 389	Senior Design I	2	CIVE 290 GENG 221 GENG 222	CIVE 209
5	CSPR XXX	Cultural Studies	3		
Sem	Course Code	Course Title	Credit	Pre-Req	Co-Req
6	CIVE 307	Shallow Foundation Analysis and Design	3	CIVE 209 CIVE 301	
6	CIVE 308	Transportation Engineering	3	CIVE 208	
6	CIVE 390	Senior Design II	2	CIVE 389	
6		Elective Lab 1	1		
6		Elective Lab 2	1		
6		Elective 3	2		
6		Elective 4	2		
6		Elective 5	2		
6		Elective 6	3		
		TOTAL	109		

Elective 1 (3 credits from the following list or any 3-credit course approved by the Department):					
	BIOL 207	General Ecology	3		ENGL 101
	EVSC 202	Fundamentals of Geology	3		ENGL 101
Elective 2 (3 credits from the following list):					
	CHEM 202	Basic Chemistry	3		
	MECH 221	Engineering Dynamics	3	CIVE 201	
Electives 3, 4, and 5 (6 credits from the following list or any equivalent approved by the Department):					
	CIVE 319	Revit for Civil Engineers	2	CIVE 206	
	CIVE 320	Structural Detailing	2	CIVE 206	CIVE 304 CIVE 307
	CIVE 321	Advanced Computer Aided Design	2	CIVE 303	
	CIVE 322	Technical Platform Computing for Civil Engineering	2	CSIS 206	
	CIVE 323	Introduction to Geographic Information System	2	CIVE 206 CIVE 208	
Elective 6 (3 credits from the following list):					
	CIVE 305	HVAC	3		
	CIVE 311	Sanitary Engineering	3	MECH 243	
Elective Labs 1 and 2 (2 credits from the following list, or any equivalent labs approved by the department):					
	CIVE 313	Transportation Engineering Modeling	1	CIVE 206	CIVE 308
	CIVE 315	Geotechnical Engineering Modeling	1		CIVE 307
	CIVE 318	Environmental Engineering Modeling	1		
	MECH 233	Workshop Technology	1		
	PHYS 214	Fundamentals of Physics II Laboratory	1		

COURSE DESCRIPTIONS

CIVE 201 STATICS

3.0: 3 cr. E

Concept of forces, moments, and other vector quantities; analysis of force systems; conditions of equilibrium; analysis of simple structures; friction; centroids and moments of inertia; shear and bending moment diagrams.

CIVE 202 MECHANICS OF MATERIALS

3.0: 3 cr. E

Fundamental stress and strain relationships, axial stress, safety factors, statically indeterminate axially loaded members, torsion, bending and shear stresses in beams, transformation of stress, combined stresses, deflections in beams, and analysis of columns.

Pre-requisite: CIVE 201

CIVE 203 ENGINEERING DRAWING I

0.3: 1 cr. E

Concepts and practices in lettering, geometric construction, 2D multi-view and auxiliary projections, sections and connections, dimensioning, sketching wall sections, and perform architectural design. Emphasis on freehand sketching skills and learning AutoCAD (2D) basic drawing tools.

CIVE 204 CONSTRUCTION MATERIALS AND METHODS

3.0: 3 cr. E

Physical and mechanical properties of construction materials; P/C concrete, asphalt, wood, ferrous metals, non-ferrous metals; proportioning of concrete mixes including admixtures with laboratory demonstrations. Finishing materials and methods.

Pre-requisite: CIVE 202

CIVE 205 THEORY OF STRUCTURES I

3.0: 3 cr. E

Stress resultants (reactions, axial forces, shear forces, and bending moments) for beams and framed structures. Deflections of beams and frames by geometric methods (moment-area theorems and applications; conjugate beam analogy), and energy methods (virtual work method, Castigliano's theorems). Influence lines functions and their applications. Criteria for moving loads. Analysis of statically indeterminate beams and frames by force methods (consistent deformations) and displacement methods (slope deflection and moment distribution). Structural analysis with software application.

Pre-requisite: CIVE 202

CIVE 206 ENGINEERING DRAWING II

0.3: 1 cr. E

The course aims at preparing the future civil engineer to meet the growing needs of the local specifications, and to be able to understand and create architectural drawings of residential buildings. Learning this course is based on the ability of using CAD packages (Auto CAD). The course seeks to develop the student effective utilization of computer aided drafting (CAD) skills, using AutoCAD to quickly create professional-quality 3D models.

Pre-requisite: CIVE 203

CIVE 208 SURVEYING

3.0: 2 cr. E

The course consists of measuring and determining boundaries, areas, and location through traversing techniques. In addition, it includes providing the types of surveying, the methods of traversing and adjustment of errors, mathematical and physical concepts, coordinate systems, leveling, contour lines, mapping, horizontal and vertical curves.

Pre-requisite: MATH 200
Co-requisite: CIVE 214

CIVE 209 REINFORCED CONCRETE I

3.0: 3 cr. E

Fundamentals of reinforced concrete behavior, analysis and design of rectangular beams, T- beams and one-way slabs including flexural and shear behavior, development and anchorage of reinforcement, deflections and crack control.

Pre-requisite: CIVE 205

CIVE 210 STRENGTH OF MATERIALS LABORATORY

0.3: 1 cr. E

This course is designed to provide students with the basic properties, testing and inspection of common civil engineering materials that include mineral aggregates, cement, concrete, steel reinforcement and asphalt. Students will experience the way concrete is designed, mixed, compacted and tested according to international standards, and will gain a comparative knowledge of material properties and possible applications in construction. Written reports and oral presentation of experimental results are required.

Pre-requisite: CIVE 204
Co-requisite: CIVE 209

CIVE 214 SURVEYING LABORATORY

0.3: 1 cr. E

Field application of concepts learned in class (CIVE 208) including basic measuring procedures for distances, elevations, angles, bearings, azimuth; theory of measurements and errors, mapping, construction and topographic surveys, traverses, adjustment and closure, area and volume computations.

Pre-requisite: CIVE 203
Co-requisite: CIVE 208

CIVE 243 FLUID MECHANICS LABORATORY

0.3: 1 cr. E

Laboratory applications in fluid mechanics including fluid measurements and properties; flow in pipes; Reynolds number; rainfall hydrograph; forces on gates; orifices; weirs; open channel flow; and pumps.

Co-requisite: MECH 243

CIVE 290 INTRODUCTION TO THE ENGINEERING DESIGN PROCESS

0.3: 1 cr. E

This course serves as a general introduction to the engineering profession, its main objectives, and concerns. It focuses on the engineering design process, its phases, challenges and constraints. Additionally, students are exposed to the qualities and attributes of a modern day engineer as expected by professional engineering societies, including integrity, professionalism, ethical commitment, environmental requirements, and leadership, as well as the role of the engineer in society. This course aims at setting students on the way to future design and professional work.

CIVE 301 SOIL MECHANICS

3.0: 3 cr. E

Origin of soil and grain size, weight volume relationships and soil plasticity, engineering classification of soil, permeability and seepage, effective pressure concept, shear strength of soil, stress in a soil mass, soil consolidation settlement, lateral earth pressure (Retaining wall).

Co-requisite: CIVE 209

CIVE 303 COMPUTER-AIDED DESIGN**0.3: 1 cr. E**

Application of computers to analyzing common structures. Use of standard industry software packages (ETABS and SAFE) for analyzing two dimensional and three dimensional structures including trusses, moment resisting frames, and shear walls against gravity. Introduction of Local and Global Coordinates Systems, the importance of the proper connectivity among elements as well as the definition of the Cardinal points and the insertion points. Modeling of one-way and two-way slabs using different slabs types. Export of Structure Reactions from ETABS to SAFE and modeling of foundations.

Co-requisite: CIVE 304

CIVE 304 REINFORCED CONCRETE II**3.0: 3 cr. E**

Analysis and design of reinforced concrete structures and components: short columns subject to axial loads as well as axial load with uniaxial and biaxial bending, slender columns, beams subject to torsion, and two-way slabs (flat slabs and slabs with beams). Design according to the most recent edition of ACI-318M Code.

Pre-requisite: CIVE 209

CIVE 305 HEATING, VENTILATING AND AIR CONDITIONING (HVAC)**3.0: 3 cr. E**

Environmental comfort parameters. Heat transfer in building sections. Estimating heating, cooling and ventilation loads and the choice of appropriate systems. Design and layout of distribution ducts, pipes and outlets.

CIVE 306 SOIL MECHANICS LABORATORY**0.3: 1 cr. E**

In this course, students will perform several field and laboratory test methods that are commonly used to determine the mechanical properties of soils. These properties are crucial for the design of the foundation of each construction. The course includes determination of critical soils index, classification of soils, moisture-density relationship, California bearing ratio and hydraulic conductivity tests.

Co-requisite: CIVE 301

CIVE 307 SHALLOW FOUNDATION ANALYSIS AND DESIGN**3.0: 3 cr. E**

Analysis and design of shallow reinforced concrete footings: centrally loaded isolated footing, eccentrically loaded isolated footings, combined rectangular footing, combined trapezoidal footing, strap footing, mat foundation, retaining wall design.

Pre-requisites: CIVE 209, CIVE 301

CIVE 308 TRANSPORTATION ENGINEERING**3.0: 3 cr. E**

The role of transportation in society and the engineer's role in planning, design and operation of transportation systems; consideration of system constraints, costs and basic design criteria. Theory and practice in highway design according to AASHTO criteria; design of vertical and horizontal curves and cross-sections. Introduction to traffic elements including intersection design and analysis of roads and intersections level of service.

Pre-requisite: CIVE 208

CIVE 309 ENGINEERING ECONOMY**3.0: 3 cr. E**

The course introduces the student to the fundamental concepts of engineering economy covering time value of money; effective interest rate; economic worth analysis and evaluation of private construction projects, namely: net present value, future and annual worth, and internal rate of return; evaluation of

public projects, mainly benefit to cost ratio; replacement analysis: depreciation methods; break-even analysis: economic risk and after-tax cash flow.

Pre-requisite: MATH 200

CIVE 310 BUILDING LAWS

3.0: 2 cr. E

The purpose of this course is to instruct the students to organize the building industry, and to enhance their knowledge of the Lebanese Building Laws in order to safeguard the environment, as well as private and public rights.

Pre-requisite: CIVE 203

CIVE 311 SANITARY ENGINEERING

3.0: 3 cr. E

Sources and quantities of water supply and methods of collection, treatment and distribution. Quantities, treatment and disposal of wastewater. Quality parameters, criteria and international standards for drinking water and wastewater pollution control.

Pre-requisite: MECH 243

CIVE 312 CONSTRUCTION MANAGEMENT FUNDAMENTALS

3.0: 2 cr. E

Civil Engineers working on sites as construction managers need to know the basics of construction management. Planning, scheduling and control are the three basic tools for construction managers. This course introduces the basic planning principles and procedures. It also expands on project deterministic project scheduling: mainly bar charts, network schedules AON, AOA and CPM. The course tackles the principles of cost estimation and also the quantity take-off and bar bending schedule estimation. This course introduces students to the leadership skills the construction manager must acquire.

Pre-requisites: CIVE 206, CIVE 209

CIVE 313 TRANSPORTATION ENGINEERING MODELING

0.3: 1 cr. E

Highway design using professional commercial software integrating planning, geometric design including horizontal and vertical curves design, cross-sections with cut and fill calculations, and traffic modeling including traffic lights design and level of service. Results visualizations and assessment.

Pre-requisite: CIVE 206

Co-requisite: CIVE 308

CIVE 315 GEOTECHNICAL ENGINEERING MODELING

0.3: 1 cr. E

Geotechnical analysis and design using commercial software PLAXIS including design of foundations and lateral earth retaining systems. Results visualizations and assessment.

Co-requisite: CIVE 307

CIVE 316 CONSTRUCTION MANAGEMENT MODELING

0.3:1 cr. E

Use of commercial software for the operations, planning, budgeting, scheduling, resource allocation, resource leveling, and controlling construction projects.

Pre-requisite: CIVE 209

Co-requisite: CIVE 312

CIVE 318 ENVIRONMENTAL ENGINEERING MODELING**0.3:1 cr. E**

Analysis and design using commercially available software: wastewater treatment plant; sizing of tanks; effluent concentration, results visualizations and assessment: cost analysis, operation and maintenance.

CIVE 319 REVIT FOR CIVIL ENGINEERS**3.0: 2 cr. E**

The Autodesk Revit software is a Building Information Modeling (BIM) program that streamlines the design process through the use of a central 3D model, where changes made in one view update across all views and on the printable sheets. The first part of the course is designed to teach engineering students the Autodesk Revit functionality as they would work with it throughout the design process. Students begin by learning about the user interface and basic drawing, editing, and viewing tools; then learn design development tools including how to generate a structural model and interface with ETABS for analysis and design purposes. Finally, they learn the processes that take the model to the construction documentation phase. The second part of the course focuses specifically on the ability of the engineering students to design a well-coordinated project on Revit and then use the same Revit file for scheduling, management, quantity take-off, and planning either using the Revit software or by connecting the Revit file to different management software such as Primavera or MS Project.

Pre-requisite: CIVE 206

CIVE 320 STRUCTURAL DETAILING**3.0: 2 cr. E**

A computer-aided drafting technique and drawings generation course using CAD programs. It includes generating drawings based on the conventions of engineering graphical communication with applications to different Civil Engineering areas of specialty. The course concentrates on the detailing and shop drawings preparation of Reinforced Concrete members according to ACI-315. A required project at the end of the course introduces the students to the preparation of execution drawings and consideration of production methods.

Pre-requisite: CIVE 206

Co-requisites: CIVE 304, CIVE 307

CIVE 321 ADVANCED COMPUTER AIDED DESIGN**3.0: 2 cr. E**

Advanced modeling techniques using ETABS/SAFE Software packages. It consists of modeling in multiple grid systems using Cartesian and/or Polar coordinates, as well as non-concentric modeling with a variation in the Cardinal Points and Insertion Points; the use of Section Designer members and Non-Prismatic elements; all loading types and shapes in global and local coordinates; the ETABS concept for the Pattern Live Load; modeling of inclined slabs for stairs and ramps, and modeling of shells for all types of domes. Introduction to the ETABS overwrites for the design of Reinforced Concrete members (Seismic or Non-Seismic Design) using ACI318 Provisions. Introduction to temperature loads. Design of all types of Foundations using SAFE.

Pre-requisite: CIVE 303

CIVE 322 TECHNICAL PLATFORM COMPUTING FOR CIVIL ENGINEERING 3.0: 2 cr. E

This course develops computing skills using the technical computing platform Mathematica. Topics include: introduction to Mathematica, symbolic, numeric, graphics, animations, programming, document organization and typesetting. Applications to statics, dynamics, engineering mechanics, fluid mechanics and other engineering related courses. Emphasis on ability to plan solutions to technical problems then execute and prepare organized technical reports including tables, figures and illustrations.

Pre-requisite: CSIS 206

CIVE 323 INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEM 3.0: 2 cr. E

Basic theoretical and practical understanding of GIS concepts and technical issues and its application to the design and analysis of environmental engineering systems. The focus is a fundamental understanding of spatial data acquisition, civil and geo- processing, geo-statistical methods; visualization, and querying of spatial data; network modeling, terrain mapping, and spatial analysis. Students are trained through extensive computer lab sessions. The course will be based on the recently released ESRI ArcGIS 10.5.

Pre-requisites: CIVE 206, CIVE 208

CIVE 324 STRUCTURAL STEEL DESIGN 3.0: 3 cr. E

The primary objective of the course is to provide the student with solid background in the fundamentals of structural steel design. Steel will be used for typical civil engineering structures such as trusses, bridges, and framed structures. Structural design establishes the configuration, details and dimensions for standard AISC rolled shapes. The course addresses the design of simple individual structural elements (truss members, beams and columns in braced frames) and the design of simple connections of structural elements (welded and bolted).

Pre-requisite: CIVE 205

CIVE 389 SENIOR DESIGN I 3.0: 2 cr. E

In this course, first of two “Senior Design” courses, students shall work in multi-disciplinary teams to design a civil engineering project under the supervision of a Project Advisor. Projects will contain components of several civil engineering disciplines in order to integrate many elements of the curriculum. This includes some of the following: Structures, Geotechnical, Transportation, Topography, Sanitary, Hydrology and Water resources, Environmental, and/or Project Management. Each team shall define the project objectives and scope, locate relevant codes and identify related software packages, determine design specifications according to specific local and international standards, formulate a design criteria subject to constraints such as the impact on the local community and the environment, perform project/site analyses for possible alternate solutions, and finally present the preliminary design in the form of a written report and a verbal presentation.

Pre-requisite: CIVE 290, GENG 221, GENG 222

Co-requisite: CIVE 209

CIVE 390 SENIOR DESIGN II 3.0: 2 cr. E

This course is the second of two-course “Senior Design” sequence that comprises the final year capstone design experience. In this course students working as multi-disciplinary teams shall perform a complete integrated design of a civil engineering project, with all the parameters set forth in the CIVE389 course. Students shall practice team effort and develop communication skills, where each shall take a responsibility in a variety of roles and be able to combine all efforts to produce a final deliverable culminating design project with proper engineering professionalism and ethics. The project shall be presented to the department faculty on the “Projects Day” via a written report and a verbal presentation which include several deliverables such as: Calculations, Drawings, Computer models, Specifications, and/or any other considerations that contributed to the development and the success of the project.

Pre-requisite: CIVE 389

FACULTY OF ENGINEERING GENERAL COURSES

GENG 221 ENGINEERING ETHICS

3.0: 3 cr. E

This course introduces and reinforces the concepts, theories, and practice of engineering ethics and aims at providing basic knowledge of ethics for engineers in different types of work roles. It prepares the engineering students for identifying, taking responsibility for, and finding solutions to potential ethical problems/cases. It provides students with an interactive study of ethical theory and the development of professionalism and helps them think more clearly and deeply about ethical issues of the natures that engineers often face in professional practice, and explore resources, strategies, and options for dealing with such complications. Students review case studies of ethical conflicts in engineering practice. The course also covers engineering codes of ethics and requires students to resolve theoretical situations through the application of ethical codes.

(A core BS course as of 2023/24 to replace a CSPR XXX course for students who started from year 2022/2023. Previous students can take it as an equivalent of a CSPR XXX course if they have not already taken the required 3 CSPR XXX courses)

Pre-requisite: CHEN/CIVE/ELCP/MECH/290 (according to discipline), ENGL 203

GENG 222 SUSTAINABLE DEVELOPMENT FOR ENGINEERS

3.0: 3 cr. E

This course introduces the fundamental and advanced concepts of sustainable development. It transitions students' understanding of the UN Sustainable Development Goals (SDGs) to focus specifically on the critical role of engineers in achieving these SDGs. Students should then be able to resolve problems by adopting sustainability principles, which should in turn reflect on the students' multidisciplinary design ability to ensure a proper sustainable design process to improve and preserve the quality of life for future generations.

(A core BS course as of 2023/24 to replace a CSPR XXX course for students who started from year 2022/2023. Previous students can take it as an equivalent of a CSPR XXX course if they have not already taken the required 3 CSPR XXX courses)

Pre-requisite: CHEN/CIVE/ELCP/MECH/290 (according to discipline), ENGL 203

GENG 311 ENGINEERING MANAGEMENT AND ECONOMICS

3.0: 3 cr. E

Engineers with excellent managerial skills and superior economic acumen are needed as leader of the new century engineering world. This course prepares engineers to fulfill their managerial responsibilities and acquire useful economic perspectives. This course is organized to contain two major parts: (I) Functions of engineering management, and (II) Economic fundamentals for engineering managers. Part (I) introduces the basic functions on engineering management such as planning, organizing, leading and controlling, while part (II) covers the fundamentals of engineering economics.

Refer to General Listing of Course Descriptions for:

BIOL XXX

Refer to Faculty of Arts and Sciences

CHEM XXX

Refer to Faculty of Arts and Sciences

CSIS XXX

Refer to the Faculty of Arts and Sciences

CSPR XXX

Refer to the Faculty of Arts and Sciences

ENGL XXX

Refer to the Faculty of Arts and Sciences

ENMG XXX

Refer to the Department of Engineering Management

EVSC XXX

Refer to the Faculty of Arts and Sciences

GENG XXX

Refer to the Faculty of Engineering Requirements

LISP XXX

Refer to the Faculty of Arts and Sciences

MATH XXX

Refer to the Faculty of Arts and Sciences

MECH XXX

Refer to the Department of Mechanical Engineering

MGMT 220, MRKT 456

Refer to the Faculty of Business and Management

PHYS XXX

Refer to the Faculty of Arts and Sciences