

University of Mosul جامعة الموصل



First Cycle – Bachelor's Degree (B.Sc.) – Civil Engineering

بكالوريوس - هندسة مدنية



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1. Overview

This catalogue is about the courses (modules) given by the program of Civil Engineering to gain the Bachelor of Science degree. The program delivers (56) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

2. Undergraduate Courses 2025-2026

Module 1

Code	Course/Module Title	ECTS	Semester
CE101	Mathematics I	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	2	78	72
Description			
Introduction to the basics of mathematics, to start learning calculus. The emphasis is on functions and graphs, and we also study trigonometric functions. The main building blocks of calculus. Calculus is built on the notion of limits. The rules for calculating limits are studied. We also study derivatives, slopes, tangent lines, differentiation rules, and derivatives of trigonometric functions. The chain rule, implicit differentiation, and fractional powers. Applications of derivatives, Related rates of change. Maxima, minima, curve sketching with y' and y'' . Graphing Rational functions, Asymptotes, Optimization. Types of Matrices, operations, sum, multiplication by a scalar, and multiplication between two matrices. Determinants, the adjoint of a matrix, the inverse of a matrix, and solving systems of linear equations using Matrices.			

Module 2

Code	Course/Module Title	ECTS	Semester
CE102	Engineering Mechanics I	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	2	78	72
Description			
It is theoretical material considered a precursor to strength of materials, the principles of structural theory, and the design of steel structures. Through this course, the student will be able to identify forces and their types, calculate the resultant and moments of forces, and analyze and identify the types of structures such as beams, trusses, and frames. In addition, the student will be able to calculate centroids for areas, lines, and volumes, as well as determine the moment of inertia. Also, friction and dynamics in engineering mechanics are presented to students as fundamental topics.			

Module 3

Code	Course/Module Title	ECTS	Semester
CE103	Engineering drawing I	5	1

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
Engineering drawing is a graphical representation of an object, system, or structure that is created by engineers to communicate design information clearly and accurately. It serves as a universal language for engineers, architects, and technicians involved in design, manufacturing, and construction processes. An engineering drawing typically includes precise dimensions, geometric shapes, symbols, and annotations to convey important details about the object or system being depicted. These drawings are created using specialized drafting tools or computer-aided design (CAD) software, ensuring precise measurements and accurate representations. They provide a comprehensive view of the object from different perspectives, such as top, front, and side views, enabling engineers to visualize and analyze the design effectively. Engineering drawings are crucial for facilitating communication among stakeholders involved in manufacturing or construction, ensuring that the final product meets the required specifications and standards.			

Module 4

Code	Course/Module Title	ECTS	Semester
CE104	Geology	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	87
Description			
Geology introduces students to rocks and soils, their types and engineering properties, and how to draw topographic and geological maps. This course describes the geology of the Earth, including its related minerals and rocks, and structural phenomena. Study of topographic and geological maps. the course consists from the following topics: Definition of engineering geology, the relationship between geology and civil engineering, definition of natural minerals and their engineering properties Clay Mineralogy, Introduction to rocks and their types in the Earth's crust, Definition of sedimentary, igneous and metamorphic rocks, their types and geological characteristics, Weathering, erosion and soil formation, Geological structures - folds, faults and joints in rocks and their impact on engineering structures Ground water - storage and movement of ground water, factors affecting groundwater movement and ground water quality			

Module 5

Code	Course/Module Title	ECTS	Semester
CE105	Statics I	3	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	33	42
Description			
This course provides an introduction to the fundamental concepts and methods of Statistics, focusing on the collection, presentation, analysis, and interpretation of data for engineering applications. It begins with basic statistical concepts and data presentation techniques, including tabular summaries,			

frequency tables, and graphical methods such as histograms and frequency polygons. The course then examines measures of central tendency (mean, median, and mode) and measures of dispersion for both ungrouped and grouped data. Building on these descriptive tools, students are introduced to the principles of **Probability Theory**, including probability rules, mutually and non-mutually exclusive events, independent and dependent events, conditional probability, and **Bayes' Theorem**. Finally, the course explores the concept of **Random Variables**, their classification into discrete and continuous types, and discrete probability distributions, with particular emphasis on the **Binomial Distribution**. By the end of the course, students will be able to apply statistical and probabilistic methods to analyze engineering data and support informed decision-making in engineering contexts.

Module 6

Code	Course/Module Title	ECTS	Semester
UOM1040	Democracy and Human Rights	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	33	17
Description			
Origins of human rights and their progress in human history, Human rights – Limitation Definition and guarantee, General freedoms, General theory for general freedoms, Law system for general freedoms, Guarantee for general freedom, Concept of equality, classification of general freedoms, Basic of personal freedoms and democracy, Freedom of free travel (movement), Personal freedom, Work freedom, Possession freedom, Trade & Commercial freedom.			

Module 7

Code	Course/Module Title	ECTS	Semester
UOM1021	English language I	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	33	17
Description			
This course covers a variety of subjects that help students learn more about the English language. The course includes learning academic vocabulary that is mostly related to the Civil Engineering field. The course focuses on English grammar, including verb tenses, question words, adverbs and adjectives, articles, quantifiers, phrasal verbs, and comparatives and superlatives. Working on comprehensive reading is another objective in this course. Besides, practicing listening and speaking in class and watching videos. At the end of the course, students learn how to write an academic paragraph using all the vocabulary and grammar that they learned within the semester.			

Module 8

Code	Course/Module Title	ECTS	Semester
CE106	Mathematics II	7	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)

3	2	78	97
Description			
Introduction to the second main branch of calculus, which is integration. The integral is a mathematical way used to find the area between a curve and the x-axis. Also, we studied the applications of definite integrals: Areas between Curves, Volumes of solids of revolution (Disks and Washers). Cylindrical shells, length of curves in the plane, Areas of surfaces of Revolution. The calculus of transcended functions, inverse functions, $\ln x, e^x$ and logarithmic differentiation, General exponential and logarithmic function. Indeterminate forms and l'Hopital's Rules, The inverse of trigonometric functions. Techniques of integration, basic integration formulas, Integration by parts, Trigonometric integrals, Trigonometric substitution, Rational functions and partial fractions.			

Module 9

Code	Course/Module Title	ECTS	Semester
CE107	Engineering Mechanics II	7	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	2	78	97
Description			
It is theoretical material considered a precursor to the strength of materials, structural theory, and the design of steel structures. Through this course, the student will be able to identify forces and their types, calculate the resultant and moments of forces, and analyze and identify the types of structures such as beams, trusses, and frames. In addition, the student will be able to calculate centroids for areas, lines, and volumes, as well as determine the moment of inertia. Also, friction and dynamics in engineering mechanics are presented to students as fundamental topics.			

Module 10

Code	Course/Module Title	ECTS	Semester
CE108	Engineering drawing II	6	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	87
Description			
Engineering drawing is a graphical representation of an object, system, or structure that is created by engineers to communicate design information clearly and accurately. It serves as a universal language for engineers, architects, and technicians involved in the design, manufacturing, and construction processes. An engineering drawing typically includes precise dimensions, geometric shapes, symbols, and annotations to convey important details about the object or system being depicted. These drawings are created using specialized drafting tools or computer-aided design (CAD) software, ensuring precise measurements and accurate representations. They provide a comprehensive view of the object from different perspectives, such as top, front, and side views, enabling engineers to visualize and analyze the design effectively. Engineering drawings are crucial for facilitating communication among stakeholders involved in manufacturing or construction, ensuring that the final product meets			

the required specifications and standards.

Module 11

Code	Course/Module Title	ECTS	Semester
UOM1031	Computer 1	3	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	2	48	27
Description			
This course will cover computing fundamentals and Microsoft Office applications. The course includes activities and exercises that guide students in exploring the Windows operating system, changing settings, and customizing the desktop. Students also learn how to manage files and folders. On the other hand, the Key Applications focus on two of the Microsoft Office applications: Word and Excel. The course explains the purpose of commonly used software features and provides step-by-step demonstrations of how to use them. It includes an introduction to the computer, its hardware and software components, and the Microsoft Office software package. Word program, Home menu, printing and formatting in the Word program, tables in the Word program, layout, and the View menu. And the Excel program, the Home menu, the functions in Excel, the insert list, drawing curves in Excel, the PowerPoint program.			

Module 12

Code	Course/Module Title	ECTS	Semester
CE109	Statistics II	3	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	33	42
Description			
This course continues the study of Statistics by focusing on statistical inference and continuous probability models used in engineering analysis. It begins with Normal Distribution and its properties, including methods for determining probabilities under the normal curve and working with normally distributed populations. The course then introduces Hypothesis Testing, covering the types of errors in statistical testing and the systematic steps for evaluating statistical claims. Students learn to perform hypothesis tests for population means when the variance is known or unknown, using techniques such as the t-test, and to construct and interpret confidence intervals. The course also examines variance analysis using the F-test, as well as goodness-of-fit and independence testing using the Chi-square distribution and the Chi-square test. Through practical applications, students develop the ability to apply statistical inference techniques to analyze engineering data, draw conclusions about populations, and support evidence-based engineering decisions.			

Module 13

Code	Course/Module Title	ECTS	Semester
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CE110	Electrical Engineering	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	33	17
Description			
This course introduces the fundamental principles of Electrical Engineering with emphasis on basic electrical concepts, circuit analysis, and practical electrical safety. Students begin by studying electricity, atomic structure, electric current, current density, Electromotive Force, and potential difference, along with the International System of Units used in electrical measurements. The course then explores essential circuit principles, including Ohm's Law, resistivity, conductivity, temperature effects, and internal resistance of sources. Methods for calculating equivalent resistance in series and parallel circuits, as well as power and energy analysis in Direct Current circuits, are also covered. In the second part, students learn practical aspects of electrical installations, including electric shock prevention, Electrical Grounding, lightning protection, residential electrical distribution, device inspection, and voltage drop calculations in transmission lines. The course equips students with both the theoretical understanding and the practical skills necessary for safe and efficient operation of electrical systems.			

Module 14

Code	Course/Module Title	ECTS	Semester
UOM1011	Arabic Language 1	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	33	17
Description			
The plan begins with an introduction to Arabic speech, covering its definition and classification. It then moves on to the Arabic sentence and its types, namely the nominal and verbal sentences. The plan also addresses the primary and secondary case endings and studies the Arabic verb in terms of soundness and weakness, as well as transitivity and intransitivity. The plan further includes linguistic and orthographic topics such as numbers and their masculine and feminine forms, punctuation marks, and the rules for writing the hamza, as well as distinguishing between the tā' marbūṭa and tā' maftūḥa. It also discusses common errors made by speakers and writers, and examines declarative and non-declarative styles. The plan concludes by focusing on developing language skills, improving writing style, and enhancing learners' linguistic taste and proficiency.			

Module 15

Code	Course/Module Title	ECTS	Semester
CE201	Mathematics III	5	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	1	63	62
Description			

Provide the fundamental base for elementary mathematics for functions in more than one variable. Partial Derivative. Second Order Partial Derivative, Higher Order Partial Derivative, Chain Rule, Total Derivative, Maximum and Minimum & Saddle Point, t, Lagrange Multipliers. Introduction to Multiple Integration. Multiple Integrals, Double and Iterated Integrals over Rectangles, Double Integrals over General Regions, Area by Double Integration, Double Integrals in Polar Form, and Moments and Centers of Mass. Introduction to Hyperbolic Functions. Identities of Hyperbolic Functions. Graphs of Hyperbolic Functions. Derivative and Integral of Hyperbolic Functions Graphs of Inverse Hyperbolic Functions. Identities of Inverse Hyperbolic Functions. Derivative of Inverse Hyperbolic Functions. The integral of Inverse Hyperbolic Functions. Relationship between Inverse Hyperbolic Functions and Logarithm Formula. Application of Hyperbolic Functions: Catenary.

Module 16

Code	Course/Module Title	ECTS	Semester
CE202	Mechanics of Materials I	5	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	1	63	62
Description			
Mechanics of Materials I is one of the fundamental modules in Civil Engineering. The aims of studying this module are teaching students the developed stresses, strains, and the effects of Poisson's ratio in various types of structural elements, teaching students the developed stresses due to changes in temperature or torsion, and teaching students in detail drawings of the shear and moment diagrams and the calculation of deflection and rotation in beams and drawing of the elastic curve. At the end of the course students will be able to calculate the developed stresses in various structural elements, calculate the developed strains in various structural elements, calculate the developed thermal stresses in various structural elements, calculate the developed stresses in various structural elements due to torsion, draw the shear and moment diagram and find maximum shear and moments in beams, draw the elastic curve of loaded beams, and calculate the developed deflections and the angle of rotation in beams.			

Module 17

Code	Course/Module Title	ECTS	Semester
CE203	Fluid mechanics	5	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
Fluid mechanics is a branch of civil engineering that deals with the behavior and flow of fluids, including liquids and gases, in various engineering applications. It focuses on understanding the fundamental principles and equations governing fluid motion to analyze and design hydraulic systems such as water supply networks, drainage systems, and stormwater management. In civil engineering, fluid mechanics plays a vital role in designing and optimizing structures like dams, bridges, and pipelines that interact with fluids. It involves studying fluid properties, such as density, viscosity, and pressure, as well as the forces acting on fluids, such as gravity and fluid friction. Key concepts in fluid mechanics for civil engineering include Bernoulli's principle, Reynolds number, flow equations, and hydraulic modeling techniques. By applying fluid mechanics principles, civil engineers can accurately predict fluid behavior, ensure efficient system performance, prevent flooding and erosion issues, and			

create sustainable and resilient infrastructure that meets the needs of society.

Module 18

Code	Course/Module Title	ECTS	Semester
CE204	Concrete technology I	5	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
This course deals with construction materials, specifically cement and aggregate. The course covers cement components and their effects on cement types and properties, and explains all tests conducted in a concrete lab to determine cement's physical properties. This course also studies the properties of aggregates and the lab tests conducted to determine them, and identifies how these properties affect concrete in terms of workability, strength, and durability. The course then shows how to calculate the actual volume of aggregate in site based on its bulking factor and humidity conditions. The course additionally focuses on sustainable materials (environmentally friendly materials) that can replace construction materials, including supplementary cementitious materials and recycled aggregate.			

Module 19

Code	Course/Module Title	ECTS	Semester
CE205	Engineering Surveying I	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
The B.Sc. program in Civil Engineering is designed to meet the needs of all students. The Engineering Surveying subject will develop communication skills, a lifelong learning attitude, and basic science knowledge to support advancement within the surveying profession. The graduates will exhibit creativity, leadership, and team-building abilities; cultural appreciation; and an understanding of global, societal, and environmental contexts consistent with the principles of sustainable development. The graduates will be engaged in the professional practice of surveying engineering with high ethical and professional responsibilities. The program provides the ability to identify, formulate, and solve surveying engineering problems, particularly the planning, design, establishing horizontal and vertical control, land use design, boundary determination, mapping, and field layout of infrastructure that meet standards of accuracy and precision, keeping in mind cost, time, safety, and quality needs, and objectives.			

Module 20

Code	Course/Module Title	ECTS	Semester
UOM2050	Crimes of the Baath Regime in Iraq	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)

2	-	33	17
Description			
The course begins with an introduction to the concept of crime and its divisions, followed by a discussion of the different types of international crimes, including political and social crimes, with one week allocated for a midterm examination. The syllabus also examines crimes related to the suppression of the Shaabani uprising, as well as psychological crimes and their impacts. In addition, it studies crimes committed under the Ba'ath regime according to the Iraqi High Criminal Court Law of 2005. The course further covers incidents such as the Friday Agreement events, mass graves crimes, the shelling of holy shrines, and the chemical attack on Halabja. In the final weeks, the plan addresses the use of internationally prohibited weapons and environmental crimes associated with the former regime in Iraq, as well as mass grave incidents and acts of genocide, providing a comprehensive legal and historical understanding of these crimes.			

Module 21

Code	Course/Module Title	ECTS	Semester
UOM2012	Arabic Language 2	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	33	17
Description			
The course begins with the fundamentals of Arabic grammar, followed by key grammatical subjects such as the subject and predicate (al-mubtada' and al-khabar) and their related complements. It also covers grammatical structures including <i>kāna</i> and its sisters, <i>inna</i> and its sisters, and <i>ẓanna</i> and its sisters. In addition, the syllabus addresses accusative nouns, the absolute object (al-maf'ūl al-muṭlaq), and common linguistic errors, along with spelling and orthographic rules. The course also introduces literary studies, particularly literature of the Abbasid era, and examines selected poetry by prominent poets such as Al-Mutanabbi, Abu Tammam, and Abu Firas Al-Hamdani. The course concludes with a final examination, providing students with a comprehensive understanding of both grammatical and literary aspects of the Arabic language.			

Module 22

Code	Course/Module Title	ECTS	Semester
CE206	Mathematics IV	5	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	1	63	62
Description			
Provide the fundamental basis for elementary mathematics, including vectors and differential equations. Three-Dimensional Coordinate Systems, The distance between two points, Vectors, Component Form, Vector Algebra Operations, Properties of Vector Operations, Midpoint of a Line Segment, The Dot Product, Angle Between Vectors. The Angle Between Two Nonzero Vectors u and v, Orthogonal Vectors, Dot Product Properties, and Vector Projections. The Cross Product, The Cross Product of Two			

Vectors in Space, Parallel Vectors. Properties of the Cross Product, Area of a Parallelogram, Calculating the Cross Product as a Determinant, Lines and Planes in Space. Lines and Line Segments in Space. Parametric Equations for a Line, The Distance from a Point to a Line in Space. An Equation for a Plane in Space, Equation for a Plane, Lines of Intersection, The Distance from a Point to a Plane, Angles Between Planes. Differential Equations: Definition, Classification, Order, and Degree of Des. Homogeneity and linearity of the DEs, Generation of the DEs. Solution of DEs (First order First degree DEs by Separable method). Homogeneous and non-homogeneous DEs method. Solution of DEs (First order First degree DEs by Linear and nonlinear method). Exact and non-exact methods. Second order DEs for X-is missing, y-missing. Solution of DEs (higher order DEs – Complementary solution + Particular solution).

Module 23

Code	Course/Module Title	ECTS	Semester
CE207	Mechanics of Materials II	6	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	2	78	72
Description			
Mechanics of Materials II is one of the core units in Civil Engineering. This unit aims to teach students about bending stresses in beams, as well as the shear stresses generated by the loads applied to them. The axial compound stresses and the torsional stresses imposed on the beams are also studied, and the representation of axial and torsional stresses in the elements is examined using the Mohr circle method. At the end of the course, students will be able to calculate the flexural and shear stresses in beams, determine the combined stresses in beams, and represent these stresses on the axes of the Mohr circle for various structural elements.			

Module 24

Code	Course/Module Title	ECTS	Semester
CE208	Building construction and damages assessment	3	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	48	27
Description			
This course provides details on the construction of different types and methods, and the stages of building construction of all kinds. It aims to develop students' knowledge of construction methods and the procedures for carrying out work on various items, as an important part of civil engineering. And an explanation of how to erect frameworks of different types, wooden ones in particular, being the most widespread, and how to follow the methods of pouring concrete in a manner suitable for each case to make the concrete sound good.			

Module 25

Code	Course/Module Title	ECTS	Semester
CE209	Concrete Technology II	5	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
This course deals with the properties of plastic and hardened concrete. The course first shows how to detect bleeding in plastic concrete and how it affects hardened concrete. The course also identifies the properties of hardened concrete and the factors that affect them. The course also shows the effects of w/c ratio on concrete strength and durability, and of test conditions on concrete strength. Besides, the course identifies the effect of cement type and aggregate nature on concrete strength. The course states all methods used to measure the tensile strength of hardened concrete and its relation to compressive strength. The course also explains how to calculate the modulus of elasticity of concrete according to different international codes, as well as concrete drying shrinkage and its effect on durability. Finally, the course covers in detail how to design the concrete mix using the ACI Method and how to accept the compressive strength results in accordance with the Iraqi Code.			

Module 26

Code	Course/Module Title	ECTS	Semester
CE210	Engineering Surveying II	6	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
The B.Sc. program in Civil Engineering is designed to meet the needs of all students. The Engineering Surveying subject will develop communication skills, a lifelong learning attitude, and basic science knowledge to support advancement within the surveying profession. The graduates will exhibit creativity, leadership, and team-building abilities; cultural appreciation; and an understanding of global, societal, and environmental contexts consistent with the principles of sustainable development. The graduates will be engaged in the professional practice of surveying engineering with high ethical and professional responsibilities. The program provides the ability to identify, formulate, and solve surveying engineering problems, particularly the planning, design, establishing horizontal and vertical control, land use design, boundary determination, mapping, and field layout of infrastructure that meet standards of accuracy and precision, keeping in mind cost, time, safety, and quality needs, and objectives.			

Module 27

Code	Course/Module Title	ECTS	Semester
UOM2032	Computer 2	5	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	2	48	27

Description
The student with knowledge and a development environment, and basic MATLAB Programming. Learn programming using MATLAB. Introduction to the MATLAB program and its menus. Variables and constants, mathematical expressions and symbols used in MATLAB, arithmetic relations, logical relations, and stored functions in MATLAB. Matrices and vectors, functions defined on them, mathematical operations on them, dot and cross multiplication, matrix transpose, matrix inverse. Programming using MATLAB, input and output, if conditionals, if-else, and recurrence statements in MATLAB. Also, Solution of Equations by Iteration, fixed point iteration method, Newton-Raphson method, and Secant method by MATLAB. Solve some engineering problems using MATLAB.

Module 28

Code	Course/Module Title	ECTS	Semester
UOM2022	English language 2	2	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	33	17
Description			
This course covers a variety of subjects that help students learn more about the English language. The course includes learning academic vocabulary that is mostly related to the Civil Engineering field. The course focuses on English grammar, including verb tenses, question words, adverbs and adjectives, articles, quantifiers, phrasal verbs, and comparatives and superlatives. Working on comprehensive reading is another objective in this course. Besides, practicing listening and speaking within the class, and watching videos. At the end of the course, students learn how to write an academic paragraph using all the vocabulary and grammar that they learned within the semester.			

Module 29

Code	Course/Module Title	ECTS	Semester
CE301	Differential Equations	4	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	-	48	52
Description			
The subject covers the main topics of differential equations and their applications. The course begins with second-order linear differential equations and progresses to solving higher-order equations and related applications. Fundamental mathematical tools such as matrices, determinants, eigenvalues, and eigenvectors are introduced to support advanced analytical methods. The syllabus then addresses systems of differential equations using the operator (D), followed by Fourier series and their practical applications. Later weeks focus on partial differential equations, including the wave and heat equations, with an emphasis on problem-solving and engineering interpretation. The course also introduces vibration analysis of beams, covering both longitudinal and transverse free vibrations, which are essential topics in structural and mechanical engineering. Finally, applications of the Laplace equation are discussed.			

Module 30

Code	Course/Module Title	ECTS	Semester
CE302	Theory of Structures I	5	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
Through the study of the design and many types of structures, students are introduced to the engineering components of structures. The students' expertise as future civil engineers is steadily increasing so they can evaluate fixed structures and determine whether these structures are stable. When reactions and internal forces can be calculated only from free-body diagrams and equations of equilibrium, a structure is said to be statically determinate. This course will cover the conjugate beam method, the virtual work approach, and Castigliano's first theorem calculations of the deformations of determinate structures. Finally, this course will address sketching the influence lines of fixed structures (beams, trusses, and girders).			

Module 31

Code	Course/Module Title	ECTS	Semester
CE303	Soil Mechanics I	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	2	78	72
Description			
The course is designed to provide students with fundamental knowledge of geotechnical engineering principles. It begins with an introduction to soil engineering, including the physico-mechanical and hydraulic properties of soils, soil improvement techniques, earth pressure, and slope stability. The course aims to establish a solid foundation that will support students in studying foundation design in their fourth year. Upon completion, students will be able to understand soil formation through weathering processes, classify soils according to international classification systems, and evaluate their suitability for civil engineering applications. They will also be able to solve problems related to soil phase relationships and understand key geotechnical principles such as soil compaction, including relevant laboratory tests and compaction methods, the flow of water in soil including permeability and seepage, and the principle of effective stress and its engineering implications. This knowledge equips students with essential analytical and practical skills in soil mechanics.			

Module 32

Code	Course/Module Title	ECTS	Semester
CE304	Reinforced concrete I	5	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			

Designing and analyzing reinforced concrete beams involves a comprehensive understanding of materials, design methods, and critical considerations such as shear and torsion. Concrete, with its compressive strength, is combined with steel reinforcement to provide the necessary tensile strength. The design methods outlined in the ACI 318-19 standard, including the Allowable Stress Method (ASM) and Ultimate Strength Method (USM), guide engineers in determining the required reinforcement and ensuring structural integrity. Additionally, considering shear strength and designing for torsion is essential to prevent failure and maintain stability. By incorporating these principles, engineers can create robust and efficient reinforced concrete beams that meet the required strength, safety, and performance criteria. This knowledge and application enable the successful design and analysis of reinforced concrete beams, contributing to the construction of durable and resilient structures.

Module 33

Code	Course/Module Title	ECTS	Semester
CE305	Highway Engineering I	5	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
Highway Engineering I is an engineering discipline that branches from civil engineering and involves the planning, design, and operation of roads to ensure the safe and efficient transportation of people and goods. Standards of highway engineering are continuously being improved. Highway engineers must take into account future traffic flows, design of highway intersections/interchanges, and geometric alignment and design. The most appropriate location, alignment, and shape of a highway are selected during the design stage. Highway design involves the consideration of three major factors (human, vehicular, and roadway) and how these factors interact to provide a safe highway. Human factors include reaction time for braking and steering, visual acuity for traffic signs and signals, and car-following behavior. Vehicle considerations include vehicle size and dynamics, which are essential for determining lane width and maximum slopes and for selecting design vehicles. Highway engineers design road geometry to ensure the stability of vehicles when negotiating curves and grades and to provide adequate sight distances for undertaking passing maneuvers along curves on the roadway.			

Module 34

Code	Course/Module Title	ECTS	Semester
CE306	Engineering Project Management	2	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	33	17
Description			
The course begins with an introduction to project management concepts, including project definition, objectives, and the stages of construction projects. It then addresses essential administrative aspects, including bidding documents, contract agreements, and the roles of the construction project team. Planning techniques are introduced through work breakdown structures (WBS), task definition, and duration estimation. The course also covers task relationships, Gantt charts, the Critical Path Method (CPM), and precedence networks for project scheduling. Further topics include schedule control, project updating, and time–cost trade-off analysis. Practical skills are developed using MS Project,			

including scheduling, resource allocation, tracking, and reporting. Finally, the course examines project monitoring and financial performance through S-curves, cash flow analysis, work progress evaluation, and earned value analysis for cost and schedule control.

Module 35

Code	Course/Module Title	ECTS	Semester
CE307	Hydrology	3	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	33	42
Description			
The Engineering Hydrology course provides the essential framework for quantifying water movement to design safe and resilient infrastructure. We begin by analyzing the hydrologic cycle and precipitation, using statistical methods like the double mass curve to ensure data accuracy for watershed planning. The core of the course focuses on surface water dynamics—specifically, runoff and hydrograph analysis—which allows us to predict how a landscape responds to storms. By mastering unit hydrographs and flood routing, you will learn to simulate how flood waves move through reservoirs and river channels, a critical skill for bridge and dam design. Finally, we address subsurface resources by studying groundwater and well hydraulics. Ultimately, these topics transition raw environmental data into the precise mathematical models required to manage water resources and mitigate flood risks in civil engineering projects.			

Module 36

Code	Course/Module Title	ECTS	Semester
CE308	Numerical Analysis	4	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	48	52
Description			
The Numerical Analysis curriculum provides the mathematical foundation for solving complex engineering problems that cannot be addressed through exact analytical solutions. In civil engineering, we rely on these computational techniques to model structural behavior, fluid flow, and soil mechanics. The course covers root-finding methods like the Newton-Raphson method, interpolation for data estimation, and sophisticated matrix operations such as LU Factorization and the Gauss-Seidel method for solving large systems of linear equations. Additionally, you will learn numerical integration and least squares curve fitting to interpret experimental data. By implementing these algorithms in MATLAB, you will bridge the gap between theoretical physics and practical design, enabling you to simulate and analyze the intricate systems inherent in modern infrastructure projects.			

Module 37

Code	Course/Module Title	ECTS	Semester
CE309	Theory of Structures II	5	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)

2	2	63	62
Description			
Studying various structures and their designs introduces students to structural engineering. After that, future civil engineers learn to evaluate fixed and indeterminate structures. Students will analyze statically indeterminate beams, trusses, rigid frames, and composite structures using consistent deformations, least work, slope-deflection, and moment distribution methods. This semester introduces the slope-deflection method, degrees of freedom, the derivation of the slope-deflection equation, equilibrium conditions for joints and shear, and solved beam and frame examples. An introduction to the moment distribution method, fixed end moments, flexural stiffness, distribution factors, carry over factors, sign convention and correctness, a description of the moment distribution, and solved beams and frames are also given. Students will sketch influence lines for indeterminate-structure beams in the final section of this course.			

Module 38

Code	Course/Module Title	ECTS	Semester
CE310	Soil Mechanics II	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	2	78	72
Description			
This course aims to teach students to understand shear strength calculations, methods of measuring its parameters, and factors affecting soil shear strength and shear stress calculation. Representation of failure level on Mohr circle, properties derived from the Mohr circle, failure theory, Mohr envelope of stresses, and factors affecting shear strength. Also, the topic of soil lateral pressure and its calculations is explained, covering the design of supporting structures, types of soil lateral pressure, lateral pressure coefficients, calculations of soil lateral pressure, and the distribution of soil lateral pressure on supporting structures. Compaction and mechanical soil improvement methods (basic principles, compaction theory, compaction mechanics and role Water in it, the main variables affecting the compaction process, the relationship between density and the percentage of water, Curve compaction, laboratory compaction, saturation curve, change of cohesive soil structure during compaction, Effect of compaction on cohesive soil properties, in-situ compaction, control of compaction operations Location. Introduction to the stability of slopes. The safety coefficient is the factor affecting the stability of the slope			

Module 39

Code	Course/Module Title	ECTS	Semester
CE311	Reinforced concrete II	5	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
Designing and analyzing reinforced concrete columns involves a comprehensive understanding of materials, column types (short and slender), and critical considerations such as development length and lap splice of steel bars under tension and compression. Concrete, with its compressive strength, is			

combined with steel reinforcement to provide the necessary tensile strength. The design methods outlined in the ACI 318-19 standard guide engineers in determining the required reinforcement and ensuring structural integrity. Additionally, considering the design and strengthening for compression and tension failures is essential to prevent failure and maintain stability. By incorporating these principles, engineers can create robust and efficient reinforced concrete columns that meet the required strength, safety, and performance criteria. This knowledge and application enable the successful design and analysis of reinforced concrete columns, contributing to the construction of durable and resilient structures.

Module 40

Code	Course/Module Title	ECTS	Semester
CE312	Highway engineering II	5	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
This course involves the planning, design, construction, operation, and maintenance of roads to ensure the safe and efficient transportation of people and goods. Standards of highway engineering are continuously being improved. Highway engineers must take into account future traffic flows, the design of highway pavement materials, the structural design of pavement thickness, and pavement maintenance. The materials used in roadway construction have evolved over time. There are two major types of pavement surfaces: Hot-Mix Asphalt (HMA) and Portland Cement Concrete (PCC). Underneath this wearing course are material layers that give structural support for the pavement system. These underlying surfaces may include the aggregate or treated base and subbase layers, as well as the underlying natural or treated subgrade. These treated layers may be cement-treated, asphalt-treated, or lime-treated.			

Module 41

Code	Course/Module Title	ECTS	Semester
CE313	Hydraulic Structures	3	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	33	42
Description			
A hydraulic structure is a device used in natural or man-made waterways to impound, direct, control, or measure the flow of water, and can be built where there is a need for a change in the natural flow of water, such as dams and barrages, spillways, culverts, cross drainage works, sluice gates, weirs, and flumes. Some are fixed geometrical forms, while others may be mechanically adjusted. Hydraulic structures are also referred to as structures that are submerged or partially submerged in a body of water and disrupt the natural flow of water. Hydraulic design procedures sometimes include hydraulic model testing when a proposed design requires a configuration that differs significantly from known documented guidelines.			

Module 42

Code	Course/Module Title	ECTS	Semester
CE314	Engineering Project Design and Planning	2	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	33	17
Description			
Providing the technical possibility for students to use the various engineering programs. Helping students analyze and design multi-story buildings and footings as well as retaining structures. So, reducing the effort involved in analyzing and designing them manually by adopting all theoretical concepts that were taken in the previous stages and applied in this course.			

Module 43

Code	Course/Module Title	ECTS	Semester
CE401	Design of Reinforced Concrete Structures I	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	78	72
Description			
The students will be familiar with the fundamentals for reinforced concrete design floors, beams, and stairs, considering the international codes in design, such as the ACI-Code. It also uses the yield line theory for slab analysis. To make the student understand and start working in the design field.			

Module 44

Code	Course/Module Title	ECTS	Semester
CE402	Foundation Engineering I	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	78	72
Description			
Foundation engineering is a fascinating subject that deals with the safe and economical transfer of loads from superstructures of various types, sizes, and functions to the ground. In Foundation Engineering I, lectures have been organized into four parts: the first part has covered the site investigation, which helps students understand the soil report, including soil properties and soil profile for a site. The second part has covered the bearing capacity of shallow foundations (theory, equations, and applications). The third part has covered the immediate and consolidation settlements of shallow foundation, which is as important a topic as the bearing capacity. Finally, the fourth topic covered the geotechnical design of foundations, where the footing size and depth can be specified.			

Module 45

Code	Course/Module Title	ECTS	Semester
CE403	Steel Design I	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	67
Description			
This Structural Steel Design course deals with the basic rules for designing safe and effective steel structures in accordance with the AISC 360-16 standard. As engineers, we begin by mastering the mechanical properties of steel and the two primary design philosophies: Load and Resistance Factor Design (LRFD) and Allowable Strength Design (ASD). The main part of the course looks at how tension and compression members work, where you will study important failure points like gross section yielding, net section fracture, block shear, and buckling. By exploring concepts like the Euler buckling theory, slenderness ratios, and effective length, you will learn to ensure the stability of columns under heavy axial loads. Ultimately, this course bridges the gap between material science and practical construction, equipping you with the analytical skills to design everything from simple built-up sections to complex multi-story frames and column base plates.			

Module 46

Code	Course/Module Title	ECTS	Semester
CE404	Traffic Engineering I	4	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	67
Description			
The Traffic Engineering course explores the fundamental interactions between road users, vehicles, and the physical roadway to optimize the safety and efficiency of transportation systems. We begin by analyzing human and vehicle characteristics that influence traffic behavior, then dive into the core mathematical relationships among speed, flow, and density. You will learn to apply various traffic flow models and conduct essential field investigations, including spot speed, volume, and travel time studies, to quantify real-world conditions. The curriculum also addresses critical urban challenges by analyzing parking and accident data to identify data-driven safety improvements. By synthesizing these data collection methods and analytical models, you will gain the expertise needed to manage congestion, reduce delays, and design infrastructure that meets the diverse mobility needs of modern communities.			

Module 47

Code	Course/Module Title	ECTS	Semester
CE405	Structural Drawing	3	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
-	2	33	42
Description			

Structural Drawing introduces students to the structural drawings by studying their formation, drawing, and detailing, then gradually enriching their knowledge as civil engineers who can deal with all engineering drawings, enabling students to draw and read structural, architectural, plumbing, and electrical plans, and to be able to deal with them skillfully.

Module 48

Code	Course/Module Title	ECTS	Semester
CE406	Applied Chemistry	2	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	33	17
Description			
This course dives into the chemical and physical complexities of cement-based materials to ensure the longevity and sustainability of modern infrastructure. We begin with the chemistry of cement compounds and the hydration process, which are the fundamental reactions that transform raw materials into a load-bearing matrix. A major focus is on durability, in which you will analyze destructive mechanisms such as sulfate attack, alkali-silica reaction (ASR), and reinforcement corrosion to prevent premature structural failure. Furthermore, the curriculum addresses the industry's future by exploring green concrete production, the use of recycled waste materials, and the application of chemical admixtures and fibers to enhance performance. By mastering these specialized topics, you will be equipped to engineer high-performance, environmentally friendly concrete solutions that can withstand the most aggressive exposure conditions.			

Module 49

Code	Course/Module Title	ECTS	Semester
CE407	Engineering Project I	3	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
-	2	32	43
Description			
This module allows students to apply the ideas, principles, strategies, and approaches they learned in their undergraduate courses to a practical civil engineering project. The main objectives of the graduation project are: 1. To help students understand and apply basic engineering design concepts in a multidisciplinary civil engineering project. 2. To expose the students to group learning and teamwork by working on a multidisciplinary project. 3. To improve the oral and written communication skills of the students. 4. Prepare students for the practical tasks of the workplace after graduation. This includes building students' ability to complete a project.			

Module 50

Code	Course/Module Title	ECTS	Semester
CE408	Reinforced concrete design II	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)

2	2	63	62
Description			
The students will be familiar with the fundamentals of reinforced concrete design for prestressed structures, considering international design codes such as ACI and AASHTO. Students should recognize precast construction and prestressed concrete specifications. Another item is the design of reinforced concrete bridges. To enable the student to understand and start working in the design field			

Module 51

Code	Course/Module Title	ECTS	Semester
CE409	Foundation Engineering II	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
In Foundation Engineering II, lectures are organized into three parts: the first part covers the structural design of different types of shallow foundations. The second part has covered the analysis and design of deep foundations. More specifically, it covers the ultimate pile capacity under vertical load for piles in sand and clay. It covers both single and group piles. It also covers immediate and consolidation settlement of single and group piles. The third part covers the analysis and design of retaining structures, including stability and structural aspects. Two types of retaining structures have been covered: gravity and cantilevered.			

Module 52

Code	Course/Module Title	ECTS	Semester
CE410	Steel Design II	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	67
Description			
This course provides an integrated study of steel design , beginning with a review of fundamental concepts, including axial member behavior, load combinations, and interpreting structural analysis results. It examines flexural member behavior, including stress distribution, elastic and plastic responses, plastic moment capacity, and the influence of cross-sectional shape. The course also covers section classification and local buckling, emphasizing width-to-thickness limits and their impact on strength. The course discusses beam design procedures using LRFD and ASD methods, including lateral-torsional buckling, shear strength, and deflection limits. The course studies the behavior and design of beam-columns under combined axial load and bending, including interaction equations, moment amplification, and stability under uniaxial and biaxial bending. The course also introduces steel connections, focusing on load-transfer mechanisms and the design of bolted and welded joints. The course concludes with an integrated approach to member and connection design in steel structures.			

Module 53

Code	Course/Module Title	ECTS	Semester
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CE411	Traffic Engineering II	4	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	67
Description			
This course introduces the fundamental principles of traffic engineering and highway capacity analysis. It begins with an overview of traffic flow concepts, background theory, and evaluating roadway capacity and level of service (LOS). The course examines operational analysis methods for two-lane and multilane highways, including definitions, analytical procedures, and practical applications. It also covers freeway operational characteristics, focusing on basic freeway segments, weaving sections, and ramp junctions. In addition, the course studies different types of intersections, their classification, and traffic control methods. The course emphasizes the design and analysis of signalized intersections, including signal warrants, timing parameters, and performance evaluation. Applications and examples for both signalized and unsignalized intersections are discussed to illustrate practical traffic management solutions and improve roadway efficiency and safety.			

Module 54

Code	Course/Module Title	ECTS	Semester
CE412	Estimation	3	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	33	42
Description			
This estimation course introduces fundamental concepts and definitions, then covers construction materials and their standard units of measurement. It covers methods for calculating areas, volumes, and quantities essential for accurate cost estimation. Students learn to prepare preliminary estimates and organize quantity take-off tables. The course also addresses detailed estimation of concrete works (foundations, columns, slabs), earthworks including excavation and backfilling, and site leveling operations. It emphasizes estimating demolition and excavation works for dams and canals, along with interpreting technical specifications for construction items. Finally, practical comprehensive examples are provided to integrate all topics, enabling students to develop accurate, systematic, and professional estimation skills applicable to real engineering projects.			

Module 55

Code	Course/Module Title	ECTS	Semester
CE413	Environmental and Sanitary Engineering	2	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	33	17
Description			
Introduction to Environmental & Sanitary Engineering: This branch of civil engineering focuses on public health and securing pure water suitable for domestic, industrial, and commercial uses. It is also concerned with discharging polluted water from residential communities and industrial facilities, as			

well as treated rainwater outside the boundaries of populated residential areas. The course covers the basic principles and design aspects of sanitary engineering infrastructure. This comprises drinking water supply and treatment, sewerage and wastewater treatment, in addition to the deals with quality and quantity of water and wastewater calculations, design of water treatment plant units, design of water supply networks, design of sewerage systems, and design of wastewater treatment plant units.

Module 56

Code	Course/Module Title	ECTS	Semester
CE411	Engineering Project II	3	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
-	2	32	43
Description			
This module allows students to apply the ideas, principles, strategies, and approaches they learned in their undergraduate courses to a practical civil engineering project. The main objectives of the graduation project are 1. To help students understand and apply basic engineering design concepts in a multidisciplinary civil engineering project. 2. To expose the students to group learning and teamwork by working on a multidisciplinary project. 3. To improve the oral and written communication skills of the students. 4. Prepare students for the practical tasks of the work place after graduation. This includes building ability of the students to perform a complete project.			

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