

Kingdom University

College of Architectural Engineering and Design

Course Descriptions

Bachelor of Science in Civil and Environmental Engineering

1. Program Structures

Civil & Environmental Engineering Department - KU				Subject Area (Credit Hours)				Total Credit Hours
List all courses in the program by term starting with the first term of the first year and ending with the last term of the final year.				Math & Basic Sciences	Major Topic	University Topic	PRE- Requisite	
#	Course	Code	Title					
Semester 1	ENGL	103	English for Academic Purposes I			3	ENGL012	
	MATH	111	Calculus I	3			MATH095	
	PHYS	111	General Physics I	4				
	CHEM	101	General Chemistry I	4				
	GS	111	Arabic Language Skills			3		
	SUM							
Semester 2	ENGL	104	English for Academic Purposes II			3	ENGL103	
	MGT	100	Introduction to Entrepreneurship			2	-	
	MATH	112	Calculus II	3			MATH111	
	PHYS	113	General Physics II	4			PHYS111	
	CEE	175	Computer Programming using MATLAB		3			
	CEE	171	Engineering Graphics & CAD		3			
SUM								18

Civil & Environmental Engineering Department - KU				Subject Area (Credit Hours)				Total Credit Hours
List all courses in the program by term starting with the first term of the first year and ending with the last term of the final year.				Math & Basic Sciences	Engineering Topics	General Education	PRE- Requisite	
#	Course	Code	Title					
Semester 3	ENGL	202	English Writing for Communication			3	ENGL104	
	LAW	106	Human Rights			2		
	MATH	201	Calculus III	3			MATH112	
	MATH	202	Probability and Statistics	3			MATH112	
	CEE	215	Engineering Statics		3		PHYS113	
	CEE	218	Properties and Testing of Materials		3		PHYS113	
SUM								17
Se	GS	133	History of Bahrain			3		



CEE	232	Introduction to Environmental Engineering		3		CHEM101		
MATH	204	Differential Equations	3			MATH112		
MATH	203	Numerical Methods	3			MATH201		
CEE	225	Mechanics of Materials		3		CEE215		
CEE	235	Fluid mechanics & Hydraulics		3		CEE215		
SUM								18

Civil & Environmental Engineering Department - KU				Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
List all courses in the program by term starting with the first term of the first year and ending with the last term of the final year.				Math & Basic Sciences	Engineering Topics	General Education		
#	Course	Code	Title					
Semester 5	CEE	341	Surveying		3		MATH201	
	CEE	321	Structural Analysis I		3		CEE225	
	CEE	333	Water Supply and Sewerage		3		CEE235	
	CEE	351	Project Management		3		MGT100	
	CEE	331	Physical Geology		3		CEE218	
	CEE	350	Sustainable Design and Construction		3			
SUM								18
Semester 6	CEE	322	Structural Analysis II		3		CEE321	
	CEE	325	Concrete Design I		3		CEE321 + CEE218	
	CEE	342	Highway & Traffic Engineering		3		CEE341	
	CEE	326	Geotechnical Engineering		3		CEE331	
	CEE	366	Junior Design Project		3		Completion of 80 Cr.	
SUM								15

Civil & Environmental Engineering Department - KU				Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
List all courses in the program by term starting with the first term of the first year and ending with the last term of the final year.				Math & Basic Sciences	Engineering Topics	General Education		
#	Course	Code	Title					

	CEE	367	Industrial Training		2		Completion of 80 Cr.	2
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Civil & Environmental Engineering Department - KU				Subject Area (Credit Hours)			PRE-Requirement	Total Credit Hours
List all courses in the program by term starting with the first term of the first year and ending with the last term of the final year.				Math & Basic Sciences	Engineering Topics	General Education		
#	Course	Code	Title					
Semester 7	CEE	425	Concrete Design II		3		CEE325	
	CEE	426	Steel Design		3		CEE325	
	CEE	461	Engineering Practice & Ethics		3			
	CEE	4xx	Elective I		3			
	CEE	4xx	Elective II		3			
	CEE	432	Solid & Hazardous Waste Management		3		CEE333	
SUM								18
Semester 8	CEE	450	Engineering Economy		3		CEE351	
	CEE	4xx	Elective III		3			
	CEE	4xx	Elective IV		3			
	CEE	4xx	Elective V		3			
	CEE	466	Senior Design Project		3		CEE366	
SUM								15

Civil & Environmental Engineering Department - KU				Subject Area (Credit Hours)			Total
				Math & Basic Sciences	Engineering Topics	General Education	
Total Cr. Hr.				30	89	19	138
Percentage (%)				21.7	64.5	13.8	100%

Civil & Environmental Engineering Department - KU

Elective Tracks

1. Structure

#	Course	Code	Title	Cr. Hr.	PRE-Requirement
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1	CEE	421	Advanced Structural Design	3	CEE322
2	CEE	422	Pre-stressed Concrete	3	CEE425
3	CEE	423	Reinforced Masonry	3	CEE325
4	CEE	429	Advanced Steel Design	3	CEE426
5	CEE	428	Bridge Design	3	CEE425

Civil & Environmental Engineering Department - KU

Elective Tracks

2. Water Resources and Environmental Management

#	Course	Code	Title	Cr. Hr.	PRE-Requisite
1	CEE	431	Coastal Engineering	3	CEE333
2	CEE	433	Transportation and the Environment	3	CEE342+CEE232
3	CEE	434	Digital Remote sensing of the Environment	3	CEE341+CEE232
4	CEE	435	Introduction to Geo-Environmental Engineering	3	CEE232+CEE326
5	CEE	436	Special Topics in Environmental Engineering	3	CEE432+CEE333

Civil & Environmental Engineering Department - KU

Elective Tracks

3. Transportation and Remote Sensing

#	Course	Code	Title	Cr. Hr.	PRE-Requisite
1	CEE	441	Advanced Traffic Engineering	3	CEE342
2	CEE	442	Sustainable Pavement Materials & Design	3	CEE350+CEE326
3	CEE	443	Urban Transportation Planning	3	CEE342
4	CEE	444	GIS Applications in Civil Engineering	3	CEE341
5	CEE	445	Remote Sensing Applications in Civil Engineering	3	CEE341
6	CEE	441	Advanced Traffic Engineering	3	CEE342

Civil & Environmental Engineering Department - KU					
Elective Tracks					
4. Construction Engineering and Management					
#	Course	Code	Title	Cr. Hr.	PRE-Requisite
1	CEE	451	Specifications & Quantity Surveying	3	CEE351
2	CEE	452	Building Information Modelling	3	CEE351
3	CEE	453	Construction Methods and Management	3	CEE351
4	CEE	454	Construction Estimation and Cost Control	3	CEE451
5	CEE	455	Risk Management in Construction Industry	3	CEE351

Courses Description

First Year

First Semester

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
ENGL103	English for Academic Purposes I			3	ENGL012	

This is an introductory course that prepares the students to communicate in correct English for academic and professional purposes. Students enhance their reading, writing, listening as well as speaking skills through classroom activities and compose ideas in varied specified formats. This course will help the students to develop contextual analysis, team work, word processing, documentation and professional communication.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
MATH111	Calculus I	3			MATH095	

This course is first course in calculus and involves the study of functions, limits, continuity, computations of derivatives including sum, product, and quotient formulas, chain rule, implicit differentiation, applications of derivatives, related rate problems, mean-value theorem, and definite integrals.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
PHYS111	General Physics I	4				

This course provides students by an introduction to the pursuit of Physics, its history and methodology. The course also aims at emphasizing the importance of measurement which is central to physics. It covers the properties of matter, energy, oscillation & waves and light. The course will develop the experimental, computational and mathematics skills of students.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CHEM101	General Chemistry I	4				

This course provides students by the principles of chemistry applied in civil and environmental engineering. The course enables students to understand the knowledge of thermodynamic and kinetic basics including Gaseous State - Mass and heat balance in Fuel Combustion - Electrochemistry & Corrosion - Properties of Solutions & Alloys - Treatment of Water- Air Pollution - Dynamic Equilibrium in Physical & Chemical Processes- Building materials Petrochemicals- Polymers and engineering properties of materials.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
GS111	Arabic Language Skills			3		

دراسة أساسيات اللغة العربية صياغة وتركيباً ومعجماً ودلالة وإملاءً ، ومعالجة أساليبها قراءةً وتدوفاً ونقداً، وبيان خصائصها الجمالية وقيمتها الدلالية والتعبيرية من خلال نصوص تتناول الأجناس الأدبية شعراً ونثراً.

Second Semester

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
ENGL104	English for Academic Purposes II			3	ENG103	

This is a course that develops the interpretative skills related to listening, speaking, reading and writing tasks that constitute professional communication. This course covers a process-based approach namely brainstorming, drafting, developing, revising as well as editing in writing and speaking tasks, plus skimming as well as scanning for the interpretation of the text in reading and listening tasks systematically. This course helps the students describe events, make comparisons and express their preferences and recommendations.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
MGT100	Introduction to Entrepreneurship			2		

This is an introductory course in entrepreneurship which focuses on fundamentals and specifics of Entrepreneurship. This course discusses contributions to environmental improvements and the circular economy and learn how to identify and evaluate business opportunities. The course further develops students' skills to enable them to launch new ventures, strategies, products and technologies that address society's environmental and natural resource problems.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
MATH112	Calculus II	3			MATH111	

This is the second course in calculus. It continues the study of calculus by focusing on the integration techniques and applications of integration. The topics covered are techniques of integration, areas between curves, volumes of revolution, parametric calculus and polar coordinates, sequences and series, Taylor series representation of analytic functions.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
PHY113	General Physics II	4			PHYS111	

This course provides students by the basic knowledge and understanding in the area of Electricity, Electronics, Optics and Optoelectronics including the origin and limitations of the associated laws. It is Introducing the laws of motion and the laws of the momentum and energy conservation and newtons law of motions. The course will also develop analytical, numerical and computer-based problem-solving skills and the practical laboratory skills

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engine- ering Topics	General Education		

CEE175	Computer Programming using MATLAB		3			
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This course introduces students by the basic elements and practicalities of computer programming through the MATLAB mathematical computing environment. The course will cover programming fundamentals, input/output operations, and mapping and other data visualization techniques. This course provides a practical introduction to scientific computer programming techniques and applications in Civil and Environmental Engineering.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE171	Engineering Graphics & CAD		3			

This course provides students by a general introduction to engineering drawing, lettering, use of instruments and types of lines, oblique and orthographic projections, isometric, and extracting sectional drawings. The course provides an introduction to AutoCAD for two dimensional drawings, structural drawings, miscellaneous civil engineering drawings.

Second Year

Third Semester

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
ENGL202	English Writing for Communication			3	ENG104	

This is a course in English as a foreign Language that builds upon the critical, analytical and research skills to prepare students for future academic study. This covers compiling

reviews, reports, notes, summaries, presentations as well as cite references. This course develops the students' academic reading strategies, ability to differentiate literal and inferential meanings plus competent speaking skills to defend their observations..

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
LAW106	Human Rights			2		

يتناول هذا المقرر المفاهيم الأساسية لحقوق الإنسان في القانون الدولي والمواثيق العالمية والمعاهدات والتوصيات المنبثقة عن المؤتمرات والتجمعات الدولية، كما يتناول دراسة الحقوق والحريات الأساسية بموجب الاتفاقيات الدولية والحماية المقررة للأفراد بموجب الدساتير والإعلان العالمي لحقوق الإنسان.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
MATH201	Calculus III	3			MATH112	

This is the third course in calculus. It discusses the double integration, vectors and surfaces, Limits, derivatives, and integrals of vector-valued functions. It deals with Multiple and line integrals and their applications, Partial differentiation and Green's and Stokes' Theorems.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
MATH202	Probability and Statistics	3			MATH112	

Descriptive statistics, Introduction to probability and probability distributions. Some of probability Densities, Sampling distributions. Central limit theorem. t and F distributions. Estimation. Tests of hypotheses. Goodness of fit tests. Regression and correlation

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE215	Engineering Statics		3		PHYS113	

This course provides the fundamentals of force vectors, free-body diagram, equilibrium of particles, moment of forces and couples, force-couple system, distributed loading, equilibrium of rigid-body, analysis of trusses and pinned frames. Students will learn the types of internal forces in structural members, shear and moment diagrams for beams, center of gravity, centroid and moment of inertia.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE218	Properties & Testing of Materials		3		PHYS113	

The course introduces the fundamentals of Physical and mechanical properties of building materials used in construction such as aggregates, concrete, cement, masonry, and steel. It describes the of methods of testing and standardization, classification of natural and manufactured building materials. Learners are learning the behaviour and deterioration of building material under natural conditions.

Fourth Semester

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
GS133	History of Bahrain			3		

يتناول المقرر موقع البحرين وأهميته عبر العصور ، كما يبرز الخصائص الجغرافية للبحرين ، ويركز في تاريخ البحرين القديم والوسيط والحديث والمعاصر ، فيبرز التطورات والتحولت السياسية والاقتصادية والاجتماعية والثقافية وصولا إلى بيان أهمية الدولة المعاصرة وإنجازاتها.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE232	Introduction to Environmental Engineering		3		CHEM101	

This course provides an introductory overview to different aspects of environmental engineering, it provides the idea of applying the environmental regulations and standards, environmental parameters including concepts of sustainability, resilience, mass balance and natural systems, water quality management, water and wastewater treatment, air pollution control, noise pollution, and solid and hazardous waste management

Code	Title	Subject Area (Credit Hours)	PRE- Requisite	Total Credit
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		Math & Basic Sciences	Engineering Topics	General Education		Hours
MATH204	Differential Equations	3			MATH112	

Differential equations of first and second order and their solution. Separable and exact equations. Equations convertible to separable type. Higher order linear equations with constant coefficients (homogeneous and non-homogeneous). Power series method for second order linear equations. Variation of parameters. Laplace transform technique. Applications of differential equations in Civil Engineering.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
MATH203	Numerical Methods	3			MATH201	

This course provides the numerical techniques commonly used by engineers such as: roots of an equation; solutions of systems of algebraic equations; curve fitting; interpolation; integration; ordinary and partial differential equations.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE225	Mechanics of Materials		3		CEE215	

Linear elastic behaviour, allowable stresses and factor of safety, simple states of stress and strain, bending and shearing stresses in beams, torsional stresses, design of simple prismatic beams, compound stresses, plane stress and strain transformations, stresses in thin-walled pressure vessels, deflection of beams.

Code	Title	Subject Area				

		(Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE235	Fluid Mechanics & Hydraulics		3		CEE215	

This course provides students by the basic knowledge of Fluid Mechanics and Hydraulics concerns the continuous deformation of gases and liquids under shear stress. It covers the properties of fluids and introduces hydrostatic principles before delving into dynamics of flow for incompressible fluids with an emphasis on water. Students will learn how to formulate and solve fluid hydrostatics and pressure problems, analyze pipe flow situations using the Bernoulli equation, determine appropriate pump sizes for pipe systems, and analyze open channel flow situations using Manning's equation.

Third Year

Fifth Semester

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE341	Surveying		3		MATH201	

The course introduces the fundamentals of land surveying as well as measurements and instruments, it is an introductory course to plane surveying as related to the construction industry. The course enables students to learn how to measure, record, adjust and calculate directions, distances and elevations using standard field instruments like distance measurement tools, compass, theodolite, level, and total station. Topics are designed to cover basics of linear measurements (observations, corrections and calculations), surveying mathematics, map scale, basic error theory in measurements, traverse field techniques and levelling works, total station operation & applications and intro. to GPS Measurements.

Code	Title	Subject Area		

		Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE321	Structural Analysis I		3		CEE225	

Equilibrium of Rigid Bodies, stability and determinacy of beams and trusses. Analysis of determinate plane trusses. Axial force, shearing force and bending moment diagrams for determinate beams and plane frames and arches. Influence lines for statically determinate beams and trusses. Computation of displacements in determinate beams, frames and trusses using the method of virtual work. Displacements in beams using the Conjugate Beam Method

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE333	Water Supply and Sewerage		3		CEE235	

This course provides students by the basic knowledge of the estimation of water and wastewater quantity, design of water supply networks including pumping stations and storage capacity and design of sanitary and storm sewers. The course covers the main processes and methods for design and operation of treatment systems for water and wastewater, drinking water distribution systems and waste water collection systems, including stormwater, components of distribution and collection systems, water needs, composition of wastewater, drinking water quality, disinfection and selected methods for treatment of drinking water and wastewater.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		

CEE351	Project Management		3		MGT100	
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The course describes the characteristics of Construction Projects, Main Participants (Players), Project Life Cycle (Stages), Project Delivery Systems, Tendering, Construction Documents (Detailed Drawings, Tender (bid), Estimation, and Soil Investigation Reports), Project Planning, Project Scheduling, Project Monitoring, Risk assessment- Management, and Site Management.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE331	Physical Geology		3		CEE218	

This course provides students by an introduction to geology as a science and an overview of its basic principles. Students will explore aspects of Earth systems related to Earth materials and processes. Students will gain an appreciation for the complexities of Earth systems, fundamental of geology including igneous rocks and magma formation, volcanoes, earthquakes, sediments, sedimentary rocks, geologic structures, folds, faults, Earth's Interior and magnetism, mountain belts and continents.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE350	Sustainable Design and Construction		3			

The course introduces the importance of adopting forward-looking sustainable development goals and strategies, and of approaching each construction project with a clear set of sustainability targets/KPIs. It covers critical elements to consider at the design and planning stages of a project in order to incorporate sustainable construction principles. The course provides students with the knowledge of sustainable design and

construction and introduce the main requirements, technologies, tools, methods, processes and systems required to develop a sustainable building.

Sixth Semester

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE322	Structural Analysis II		3		CEE321	

Analysis of indeterminate structures by displacement methods, slope deflection and the moment distribution method, Influence lines for indeterminate beams and trusses, matrix displacement method for beams, plane trusses and frames.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE325	Concrete Design I		3		CEE321 + CEE218	

The course provides students a thorough understanding of reinforced concrete structure design. Students will learn how to design beams and slabs for both flexure and shear; how to detail reinforcement for both flexure and shear; how reinforced concrete members behave under flexure and axial loads; how to design short columns; and how slender columns behave and look. BS 8110 is the British Standard for designing members under flexure, shear, and axial loads.

Code	Title	Subject Area (Credit Hours)	PRE- Requisite	Total Credit
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		Math & Basic Sciences	Engineering Topics	General Education		Hours
CEE342	Highway & Traffic Engineering		3		CEE341	

The course covers basic of highway and transportation engineering including an introduction to both transportation systems, highway planning and surveys, principles of highway locations, geometric design of highways, the fundamentals of road traffic flow and its analysis, using this as a basis for you to be able to undertake operational analysis and design of key features of the road transport system, particularly the design of the various types of road junction.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE326	Geotechnical Engineering		3		CEE331	

This course provides students by the understanding of the design of geotechnical engineering systems. It covers; site investigations and in situ testing, lateral earth pressures and retaining wall design, foundation design, loading induced stresses and displacements, bearing capacity of shallow foundations, analysis and design of shallow foundations and the stability of slopes.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE366	Junior Design Project		3		Completion of 80 Cr. Hrs.	

This is an intermediate level design course, after students have gathered sufficient experiences on basic courses in civil engineering, core math. and core science courses. The course prepares them toward doing the junior project. It introduces the concept of literature search, referencing and citation methods. The syllabus includes introduction to professional report writing techniques and the role of Civil and Environmental engineers in the society. Performances are evaluated via oral presentation of proposal and demonstration of completed projects and report writing.

Summer Semester

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE367	Industrial Training		2		Completion of 80 Cr.	

In this course, all students in the Civil and Environmental Engineering program must participate in an approved training program in the relevant industry. At the completion of 300 hours of supervised training each student must submit a formal report and conduct an oral presentation.

Fourth Year

Seventh Semester

Code	Title	Subject Area (Credit Hours)	PRE- Requisite	Total Credit
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		Math & Basic Sciences	Engineering Topics	General Education		Hours
CEE425	Concrete Design II		3		CEE325	

This is the second course of Reinforced Concrete, it describes the design of two-way solid slabs with beams, Design of Waffle Slabs, Design of Flat and Hollow Block Slabs, Design of braced and unbraced slender columns, staircases, isolated and compound foundations. Serviceability requirements for concrete structures are applied.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE426	Steel Design		3		CEE325	

This course provides the fundamentals of design of steel tension and compression members, beams, columns, members subjected to axial load and bending, bolted and welded connections, composite steel sections, elastic and plastic design methods, design applications.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE461	Engineering Practice & Ethics		3			

The course provides develop deeper understanding the theory and practice of Engineering Practice & Ethics; it helps students to prepare themselves for their professional carriers. Students can develop their understanding and thoughts about ethical issues and the practice in which they arise. The study of ethics helps students to progress widely the

applicable skills in communication, reasoning and reflection. These skills enhance students' abilities and help them engage with other aspects of the engineering activities such as group work and work situations.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE4xx	Elective I		3			

Refer to Elective courses descriptions.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE4xx	Elective II		3			

Refer to Elective courses descriptions.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE432	Solid & Hazardous Waste Management		3		CEE323	

This course provides the principles of integrated solid waste management. Delivers an overview of municipal solid waste (MSW), industrial waste and hazardous waste management, including design and economic analysis. It indicates the planning and engineering principles needed to address the growing and increasingly intricate problem of controlling and processing the refuse (solid waste) created by urban societies and to analysis of hazardous waste constituents including; health and environmental issues related to solid waste management; steps in solid waste management-waste reduction at source.

Eighth Semester

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE450	Engineering Economy		3		CEE351	

This course describes the elements of feasibility studies; role of economic analysis; the decision-making process; Interest and equivalence; Interest formulae; Worth analysis; Cash flow analysis; Rate of return analysis; Incremental analysis; Depreciation; Income taxes; Replacement analysis.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE4xx	Elective III		3			

Refer to Elective courses descriptions.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE4xx	Elective IV		3			

Refer to Elective courses descriptions.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE4xx	Elective V		3			

Refer to Elective courses descriptions.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE466	Senior Design Project		3		CEE366	

In this is course student will apply the gained previous knowledge, design and conducted experiments, design a system, function on multi-disciplinary teams, identify, formulate,

and solve engineering problems, adhere to professional and ethical responsibilities, communicate, understand global and local impact of engineering solutions on society, engage in lifelong learning, have knowledge of contemporary issues, and use modern engineering tools for engineering practice.

Elective Tracks

1. Structures

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE421	Advanced Structural Design		3		CEE322	

This course provides the design methods of reinforced concrete rectangular ground tanks, circular ground tanks, elevated tanks, circular elevated tanks with central support, Reinforcement detailing in various components.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE422	Prestressed Concrete		3		CEE425	

This course provides the basic principles of prestressed concrete, Restressing systems, materials, analysis and design of sections for flexure, shear and torsion, partial losses of prestressed force, composite beams, continuous beams, camber and downward deflections.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE423	Reinforced Masonry		3		CEE325	

Structural analysis of loadbearing brick and block masonry. Structural design of walls, columns and beams in unreinforced and reinforced masonry. Production of masonry and properties of constituents. Application of simple structural models for calculation and design of building parts and detailing.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE429	Advanced Steel Design		3		CEE426	

This course focuses on the analysis and design of Steel frames and trusses using ASD and LRFD, the behaviour of various steel lateral load resisting systems and their structural components, Design of bolted and welded connections, Plastic Design of Continuous beams and Frames, Design of Cold-Formed Steel Sections.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE428	Bridge Design		3		CEE425	

The course provides bridge components; bridge-type selection criteria; bridge loads and design philosophy; design of reinforced concrete bridges; design of prestressed concrete bridges; design of steel bridges.

2. Water Resources and Environmental Management

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE431	Coastal Engineering		3		CEE333	

This course focuses on the basic elements of coastal engineering; it covers essential theoretical concepts for coastal engineers. The syllabus includes water wave theory, wave transformation processes, tides and sediment transport and their application in the near shore coastal zone, shallow water waves, coastal environments, climate change impact, near shore hydrodynamics and design of coastal structures. Emphasis is given to the interactions between coastal structures and processes.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE433	Transportation and the Environment		3		CEE342+CEE232	

The course focus on teaching the negative environmental externalities of transportation on the economic development of nations, overview of the potential for changing travel behaviour to promote environmental quality; parking, road congestion pricing, and transit options; the congestion-air quality nexus; energy consumption implications; and what we mean by sustainable transportation. It will discuss the comparative international transportation policies; fundamentals of transportation modes, principles of planning, evaluation, selection, adoption, financing, and implementation of alternative sustainable transportation systems.

Code	Title	Subject Area (Credit Hours)	PRE- Requisite	Total Credit
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		Math & Basic Sciences	Engineering Topics	General Education		Hours
CEE434	Digital Remote sensing of the Environment		3		CEE341+ CEE232	

This course provides the basic principles of remote sensing for civil engineers; it includes the basics concepts of remote sensing, characteristics of remote sensors, and remote sensing applications in civil and environmental applications. Students will be able to understand the structure of remotely sensed data and how to retrieve the needed information and to decide which remote sensing techniques suite their specific needs. The course contents introduce the structure of satellite orbits, sensor ranges and characteristics, image acquisition and data collection, basics of image processing and interpretation. Applications in civil engineering will be provide such as; land use and land cover, network analysis, hydrology, environmental applications, road allocation, sustainable development, urban planning, and more.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE435	Introduction to Geo-Environmental Engineering		3		CEE232+ CEE326	

This course provides students the basic knowledge of soil physics, soil chemistry, hydrogeology, and biological processes along with the principles of soil mechanics. Geo-environmental engineering” is a blend of geotechnical engineering and environmental concepts, the course covers fundamentals of geo-environmental engineering, concepts of unsaturated soil in geo-environmental engineering, multiphase behaviour of soil, Soil-water contaminant interaction studies, Waste containment system, design practices, vertical barriers, and advanced soil characterization for geo-environmental applications

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit
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		Math & Basic Sciences	Engineering Topics	General Education		Hours
CEE436	Special Topics in Environmental Engineering		3		CEE432+ CEE333	

This course provides students by advanced topics in environmental engineering and science including; Wastewater treatment and reuse, Basic concepts and applications of environmental health studies, concepts and functions of a hydro geologic system, Energy performance and the Carbon Impact of Information and Communication Technologies

3. Transportation and Remote Sensing

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE441	Advanced Traffic Engineering		3		CEE342	

The course provides a good understanding of the advanced techniques in traffic engineering, know basic quantitative methods required by traffic engineers, and understand how different road user groups interact and the consequences for traffic engineering. Examples relating to current industrial practice will be used to illustrate these key concepts.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE442	Sustainable Pavement Materials & Design		3		CEE350+CEE326	

The course explores innovative design methods that were developed to investigate distress mechanisms of pavements including alternatives intended to address some environmental performance goals. It investigates decision making and design tools that will encourage the use of more sustainable pavement materials and structures, such as permeable pavements, rubber asphalt, recycled asphalt pavement (RAP) and alternative cement binders. It also discusses the possible applications of pavement design strategies that can have a considerable impact on fuel consumption, vehicle maintenance costs, greenhouse gas (GHG) emissions, and life-cycle costs.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE443	Urban Transportation Planning		3		CEE342	

The course illustrates the role of urban transportation in the economic development of nations, overview of transport modes, growth trends, transportation planning in the developing world; and comparative international transportation policies; Fundamentals of transportation , Principles of planning, evaluation, selection, adoption, financing, and implementation of alternative urban transportation systems; formulation of community goals and objectives.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE444	GIS Applications in Civil Engineering		3		CEE341	

This course introduces the basic principle of Geographic Information Systems (GIS), it provides the concepts, techniques, and applications of spatial analysis and modelling. Topics include spatial statistics; overlay analysis; map algebra, spatial interpolation; surface analysis and terrain modelling. Emphasis will be placed on how spatial analysis and

modelling is used in civil engineering applications, and a functional component of a modern spatial information system.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE445	Remote Sensing applications in Civil Engineering		3		CEE441	

This course provides the basic principles of remote sensing for civil engineers, it includes the basics concepts of remote sensing, characteristics of remote sensors, and remote sensing applications in civil and environmental applications. Students will be able to understand the structure of remotely sensed data and how to retrieve the needed information and to decide which remote sensing techniques suite their specific needs. The course contents introduce the structure of satellite orbits, sensor ranges and characteristics, image acquisition and data collection, basics of image processing and interpretation. Applications in civil engineering will be provide such as; land use and land cover, network analysis, hydrology, environmental applications, road allocation, sustainable development, urban planning, and more.

4. Construction Engineering and Management

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE451	Specifications & Quantity Surveying		3		CEE351	

The course presents an introduction to international Construction specifications systems. Specifications classification base, purpose and coding of American MasterFormat™ and UniFormat™ are explained in detail. Moreover, the course covers role of quantity surveyors, quantity-take of process, pre-printed forms and calculation of waste in construction and building material. Students will be trained to prepare detailed bill of quantities.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE452	Building Information Modelling		3		CEE351	

The course introduces students to the principles of Building Information Modeling (BIM) such as the Autodesk Revit for civil engineering application. Students have knowledge of functions of menus, options and tools of Revit civil including user interface, straight and flexing parameters, system and non-system families, massing, components of building elements such as walls, beams, doors, floors, columns, stairs, ramps, etc. BIM creates an accurate virtual model of a building, the model is used for planning, designing, constructing, and operating the facility. Through a simulated environment, students can visualize what is to be built and identify potential design, construction, and operational problems.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE453	Construction Methods and Management		3		CEE351	

The course provides the construction methods, equipment, and cost estimating of the earthmoving, rock excavation, and concrete production phases of civil engineering construction projects.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE454	Construction Estimation and Cost Control		3		CEE451	

This course introduces the fundamental definition and concepts of estimation, conceptual estimation, preliminary estimation, detailed estimation, building systems, measurements, pricing, computer tools and applications, bidding extensions of estimation to cash flow analysis.

Code	Title	Subject Area (Credit Hours)			PRE- Requisite	Total Credit Hours
		Math & Basic Sciences	Engineering Topics	General Education		
CEE455	Risk Management in Construction Industry		3		CEE351	

Construction risks including aspects such as: costs, time, physical (personal and property), environmental, jurisdictional, reputation, and general liability. Risk levels and sensitivity for every project. The concepts, tools and techniques of construction risk management. Understanding the rationale used in developing effective risk management systems.