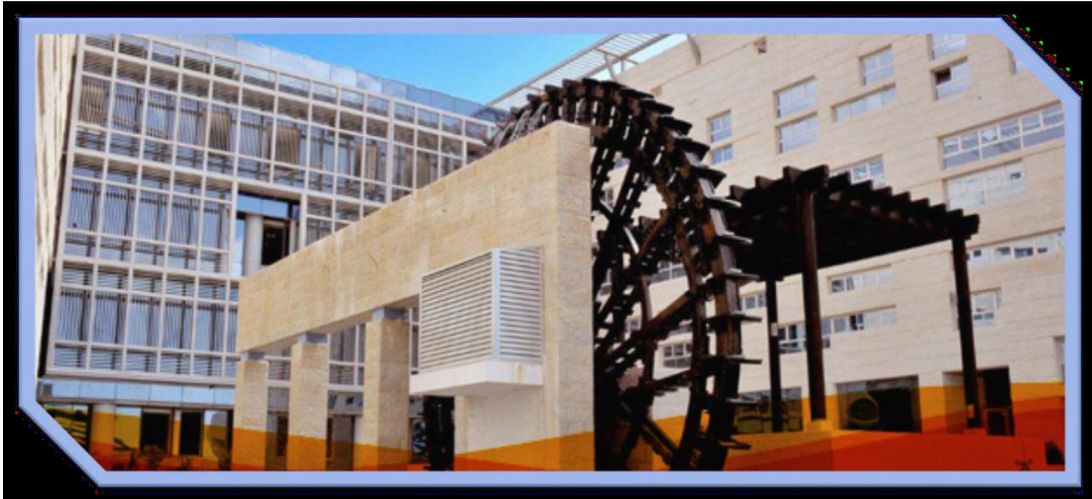




الجامعة الألمانية الأردنية
German Jordanian University

*School of Natural Resources Engineering and Management
SNREM
Department of Civil and Environmental Engineering*



*Study plan of the degree
Bachelor of Science in Civil Engineering*

2016-2017

Undergraduate Curriculum

Program of Civil Engineering

Students admitted to the Water and Environmental Engineering will enroll according to the following study plan/years.

Study Plan Summary

Classification	Credit hours
1. University requirements	27
2. School requirements	43
3. Department Requirement	98
4. Study in Germany	12
Total hours	180

List of Courses

Framework for B.Sc. Degree for the Civil Engineering Dept

1. University Requirements: (27 Credit Hours)

a. Compulsory: (21 Credit Hours)

*Student's score on placement test will decide the course level to start from

Course ID	Course Title	Credit Hours	Lecture	Lab	Prerequisite
ARB 99	Arabic 99 *	0	0	3	-
ARB 100	Arabic *	3	3	0	-
ENGL 98	English I *	0	0	3	-
ENGL 99	English II *	0	0	3	ENGL98
ENGL 101	English III *	1	0	3	ENGL99
ENGL 102	English IV *	1	0	3	ENGL101
ENGL201	English V *	2	0	3	ENGL 102
ENGL 202	English VI *	2	0	3	ENGL201
GER 101	German I *	3	0	9	-
GER 102	German II	3	0	9	GER101
NE 101	National Education (in arabic)	3	3	0	ARB 99
	National Education (in english)	3	3	0	ENGL101
MILS 100	Military Sciences	3	3	0	For Jordanian only

b. University Electives: (6 Credit Hours)

Course ID	Course Title	Credit Hours	Lecture	Lab	Prerequisite
DES101	Arts' Appreciation	3	3		ARB 99
	Arts' Appreciation	3	3		ENGL101
PE101	Sports and health	3	3	0	ARB 99
EI101	Leadership and Emotional Intelligence	3	3		ENGL101
IC101	Intercultural Communication	3	3	0	ENGL101
BE302 OR SE 301	Buisness Entrepreneurship OR Social Entrepreneurship and Enterprises	3 OR 3	3	0	ENGL101
SFTS 101	Soft Skills	3	3	0	ENGL101
	Total	6	6	0	

2. School Requirements: (43 Credit Hours):

Course ID	Course Title	Credit Hours	Lecture	Lab	Prerequisite Or Corequisite
CS 1111	Computing fundamentals	3	3	-	#CS 1112
CS 1112	Computing fundamentals lab	1	-	3	#CS 1111
CHEM 103	General Chemistry I	3	2		
CHEM106	General Chemistry lab	1	-	3	
MATH 101	Calculus I	3	3		-
MATH 102	Calculus II	3	3		MATH 101
GER 201	German III	3	0	9	GER102
GER 202	German IV	3	0	9	GER201
MATH 201	Applied Mathematics for Engineers	3	3		MATH102
MATH 231	Probability and Statistics for Engineers	3	3		MATH 201
PHYS 101	Physics I	3	3		PHYS1011
PHYS1011	General Physics Lab	1	-	3	
PHYS 102	Physics II	3	3		PHYS101
ME 111	Computer Aided Engineering Drawing	3	3		CS111
IE 121	Engineering Workshop	1			ME 111
IE 371	Engineering Economics	3	3		MATH201
Math202	Differential equations	3	3		MATH201
Total=		43			

3. Department Requirement (a. compulsory 98 Cr. Hrs)

Course ID	Course Title	Credit Hours	Lecture	Lab	Prerequisite Or Corequisite
GER 301	German V	3	0	9	GER202
GER 302	German VI	3	0	9	GER301
WEE251	Statics	3	3	-	MATH 102 PHYS 103
WEE362	Strength of materials	3	3	-	WEE251
CVE240	Dynamics	3	3	-	WEE251

WEE102	General Chemistry 2	3	3	-	CHEM 103
CVE241	Engineering geology	2	2	-	-
CVE242	Engineering geology Lab	1	-	3	CVE241 Or # CVE241
WEE211	Fluid mechanics	3	3	-	WEE251
WEE213	Hydraulics	3	3		WEE211
WEE214	Hydraulics lab	1		3	WEE213 Or # WEE213
WEE351	Surveying	2	2		ME 111
WEE353	Surveying lab	1		3	WEE351 Or # WEE351
CVE350	Building materials	2	2		WEE102 WEE362
CVE351	Building materials lab	1		3	CVE350 Or # CVE350
WEE313	Hydrology	3	-	-	WEE211
WEE363	Structural analysis (1)	3	3	-	WEE362
CVE320	Structural analysis (2)	3	3	-	WEE363
CVE370	Geotechnical engineering	3	3		WEE102 WEE362
CVE371	Geotechnical engineering lab	1	-	3	CVE370 Or # CVE370
CVE330	Highway engineering	3	3		WEE351
WEE364	Reinforced concrete 1	3	3	-	CVE350 WEE363
CVE 321	Reinforced concrete 2	3	3	-	WEE364
CVE520	Steel structures	3	3	-	CVE320
CVE372	Foundation engineering	3	3	-	CVE370
CVE331	Pavement design	3	3	-	CVE330
CVE332	Pavement Lab	1	-	3	#CVE331
CVE333	Transportation engineering	3	3	-	CVE330
CVE551	Contracts, Specifications and Quantity Surveying	3	3	-	WEE364
CVE360	Field Training in Jordan	0	-	-	
CVE460	International Internship	12	-	36	

CVE552	Engineering Projects &Construction Management	3	-	-	WEE364
CVE510	Waste water Engineering	3	3	-	WEE213
CVE511	Waste water Engineering Lab	1	-	3	CVE510 Or # CVE510
CVE512	Environmental engineering	3	3	-	CVE510
CVE568	Graduation project 1	1	-	-	
CVE569	Graduation project 2	3	-	-	
Total=		98			

3. Department Requirement (b. Electives 12 Cr. Hrs)

Course ID	Course Title	Credit Hours	Lecture	Lab	Prerequisite Or Corequisite
WEE453	Geographic Information systems	3	3	1	CS 1111
CVE421	Pre-stressed concrete	3	3	-	CVE420
CVE422	Reinforced concrete 3	3	3	-	CVE420
CVE410	Advanced topics in environmental engineering	3	3	-	WEE547
CVE430	Advanced topics in transportation and traffic engineering	3	3	-	CVE333 CVE334
CVE460	Special topics	3	3	-	
WEE527	Solid Waste Management	3	3	0	
WEE536	Water resources Engineering	3	3	-	WEE213 WEE313
CVE431	Bridge engineering	3	3	-	CVE420 CVE520
CVE470	Dam Engineering	3	3	-	WEE313 CVE420 CVE370

Mid digit Field

1. Water and Environmental Engineering
2. Structures
3. Transportation & Pavement
4. Basic Engineering Courses
5. Construction Materials
6. Graduation projects, Special Topics and Industrial Training
7. Geotechnical

Undergraduate Curriculum
Program of Civil Engineering

Year 1

First Semester

Course No.	Course Title	Credit	Weekly Hours		Prerequisite Or # Corequisite
			Lecture	Laboratory	
ENGL 98	English*	0	0	3	
CS 1111	Computing fundamentals	3	3	0	#CS1112
CS1112	Computing Fundamentals lab	1	0	3	# CS1111
CHEM 103	General Chemistry	3	3	0	# CHEM106
CHEM106	General Chemistry lab	1		3	# CHEM 103
MATH 101	Calculus I	3	3	0	-
NE 101	National Education	3	3	0	ARB 99 ENGL101
GER 101	German I	3	0	9	
PHYS 103	Physics I	3	3	0	
Total Hours		20			
* Placement test determines English Level that ranges between I and IV					

Second Semester

Course No.	Course Title	Credit	Weekly Hours		Prerequisite Or # Corequisite
			Lecture	Laboratory	
ENGL 99	English*	0	0	3	ENGL 98
GER 101	German II	3	0	9	GER101
MATH 102	Calculus II	3	3	0	MATH 101
PHYS 104	Physics II	3	3	0	PHYS103 # PHYS 106
ME 111	Computer Aided Engineering Drawing	3	1	6	CS1111
WEE102	General Chemistry II	3	3	0	CHEM103
PHYS 106	General Physics Lab	1	0	3	#PHYS 104
WEE251	Statics	3	3	0	PHYS103, MATH 101
Total Hours		19			

* Placement test determines English Level that ranges between II and V

Year 2

First Semester

Course No.	Course Title	Credit	Weekly Hours		Prerequisite Or # Corequisite
			Lecture	Laboratory	
ENGL 101	English*	1	0	3	ENGL 99
GER 201	German III	3	0	9	GER102
MATH 203	Applied Mathematics for Engineers	3	3	0	MATH102
CVE240	Dynamics	3	3	0	WEE251
IE 121	Engineering Workshop 1	1	0	3	ME 111
ARB 100	Arabic	3	3	0	-
CVE241	Engineering geology	2		0	-
CVE242	Engineering geology Lab	1	-	3	CVE241 Or # CVE241
WEE211	Fluid Mechanics	3	3	0	MATH 102, WEE251
Total Hours		19			

* Placement test determines English Level that ranges between III and VI

Second Semester

Course No.	Course Title	Credit	Weekly Hours		Prerequisite Or # Corequisite
			Lecture	Laboratory	
ENGL 102	English*	1	0	3	ENGL101
GER 202	German IV	3	0	9	GER201
MATH 231	Probability and Statistics for Engineers	3	3	0	MATH 203
WEE213	Hydraulics	3	3	1	WEE211
WEE214	Hydraulics Lab	1	0	3	WEE213 Or # WEE213
MATH205	Differential equations	3	3	0	MATH203
WEE362	Strength of Materials	3	3	0	WEE251
CVE340	Geographic Information systems	2	2	-	CS 1111
CVE341	Geographic Information systems lab	1	-	3	CVE340 Or

					# CVE340
Total Hours		20			
* Placement test determines English Level that ranges between IV and VI					

Year 3

First Semester

Course No.	Course Title	Credit	Weekly Hours		Prerequisite Or # Corequisite
			Lecture	Laboratory	
ENGL 201	English *	2	0	3	ENGL102
GER301	German V	3	0	9	GER202
IE371	Engineering Economics	3	3	0	MATH205
WEE351	Surveying	2	3	0	ME111
WEE353	Surveying lab	1	1	3	WEE351 Or # WEE351
CVE350	Building materials	2	2		WEE102 WEE362
CVE351	Building materials lab	1	1	3	CVE350 Or # CVE350
WEE363	Structural analysis (1)	3	3	-	WEE362
University Elective	To be chosen from table	3	3	0	
Total Hours		20			
* Placement test determines English Level that ranges between V and VI					

Second Semester

Course No.	Course Title	Credit	Weekly Hours		Prerequisite Or # Corequisite
			Lecture	Laboratory	
ENGL 202	English *	2	0	3	ENGL201
GER302	German VI	3	3	0	GER301
CVE320	Structural analysis (2)	3	3	-	WEE363
WEE361	Geotechnical engineering	3	3	1	WEE102 WEE362
WEE365	Geotechnical engineering lab	1		3	WEE361 Or # WEE361
CVE330	Highway engineering	3	3	0	WEE351
WEE364	Reinforced concrete 1	3	3	-	CVE350

					WEE363
CVE360	Field Training in Jordan	0			
Total Hours		18			
* Placement test determines whether student needs English VI					

Year 4

First Semester

Course No.	Course Title	Credit	Weekly Hours		Prerequisite Or # Corequisite
			Lecture	Laboratory	
Students are to decide on electives summing to 12 Credit hours. Students are referred to the suggested topics					
Total Hours		12			

Second Semester

Course No.	Course Title	Credit	Weekly Hours		Prerequisite Or # Corequisite
			Lecture	Laboratory	
CVE460	International Internship	12		36	
Total Hours		12			

Year 5

First Semester

Course No.	Course Title	Credit	Weekly Hours		Prerequisite Or # Corequisite
			Lecture	Laboratory	
CVE 321	Reinforced concrete 2	3	3	-	WEE364
CVE520	Steel structures	3	3	-	CVE320
CVE370	Foundation engineering	3	3	-	WEE361
CVE332	Pavement design	3	3	-	CVE330
CVE332	Pavement Lab	1	-	3	#CVE331
CVE333	Transportation engineering	3	3	-	CVE330
CVE510	Waste water Engineering	3	3	-	WEE213
CVE511	Waste water Engineering Lab	1	-	3	CVE510 Or # CVE510
CVE568	Graduation project 1	1			
Total Hours		21			
* Placement test determines English Level that ranges between V and VI					

Second Semester

Course No.	Course Title	Credit	Weekly Hours		Prerequisite Or # Corequisite
			Lecture	Laboratory	
MILS 100	Military Sciences	3	3	0	For Jordanian only
CVE551	Contracts, Specifications and Quantity Surveying	3	3	-	WEE364
CVE552	Engineering Projects & Construction Management	3			WEE364
CVE512	Environmental engineering	3	3	-	CVE510
CVE569	Graduation project 2	3			
University Elective	To be chosen from table	3	3	0	
Total Hours		19			
* Placement test determines English Level that ranges between V and VI					

Description of Courses

Statics (WEE251)

Vectors, force systems (2D and 3D), equilibrium of particles and rigid bodies (2D and 3D), structures (trusses, cables, frames and machines), distributed forces (centroids and centers of mass), fluid pressure, internal forces (shearing force and bending moment diagrams), friction, moment of inertia and virtual work.

Strength of Materials (WEE362)

Axial loading, material properties obtained from tensile tests, Stresses and strains due to axial loading, thermal stresses, elementary theory of torsion, solid and hollow shafts, thin-walled tubes, rectangular cross-section, stresses in beams due to bending, shear and combined forces, composite beams. Analysis of plane stress, Mohr's Circle, combined stresses. Thin-walled pressure vessels. Deflection of beams. Buckling of columns. Energy Methods.

Engineering Geology (CVE241)

Introduction to geology, plate tectonics, minerals and rocks and their engineering properties, superficial processes and deposits, landforms, rivers and flooding, landslides, structural geology, use of rocks for engineering purposes, geological and geophysical site investigation, engineering geology in practice.

Engineering geology Lab (CVE242)

Mineral and rock identification, structural geology, topographic and geological maps, flooding and landslide hazard identification, earthquakes, practical site investigation.

Surveying (WEE351)

Principles of surveying; Tape measurements (procedures, errors, and adjustments); Leveling and its application in contouring, profiles and cross-sections; Areas, volumes, and earthwork; Measurement of angles and directions; traverse surveys, topographic surveys; Electronic distance measurements (EDM); Introduction to GPS and applications. Horizontal and vertical alignment; Setting out horizontal and vertical curves.

Surveying Lab (WEE353)

Tests on distance measurements, levels and theodolites, directions and angular measurements, topographic surveys, areas and volumes; traverse surveys; Setting out horizontal and vertical curves, Training on Total Station.

Building Materials (CVE350)

Cement (types, manufacture, properties and hydration), aggregates, fresh concrete, hardened concrete (strength, strength development, shrinkage, creep), durability, mix design by ACI and DoE methods, brick and brick work, compliance with specifications.

Building Materials Lab (CVE351)

Introduction to testing & specifications, concrete and mortar tests, aggregate testing, fresh and hardened concrete testing, non-destructive tests, design & testing of concrete mixes, brick testing.

Structural Analysis (1) (WEE363)

Structural forms, types of supports, stability and determinacy, reactions, determinate structures, plane trusses, method of joints, method of sections, space trusses, shear and moment diagrams for beams and frames, three hinged arches, moving concentrated and distributed loads, influence lines for beams and trusses, Muller-Breslau principle.

Deflections: direct integration, moment area theorems, conjugate beams, real and virtual work, Maxwell's reciprocal theorem, Williot and Williot-Mohr diagrams, approximate analysis of statically indeterminate structures.

Structural Analysis (2) (CVE320)

Introduction to indeterminate structures, static and kinematic indeterminacies, principle of superposition, method of consistent deformations, influence lines of continuous beams, qualitative influence lines, indeterminate trusses, influence lines for indeterminate trusses, slope deflection, moment distribution for beams and frames, frames subject to side-sway.

Geotechnical Engineering (CVE370)

Index and classification of soils, water flow in soils (one and two dimensional water flow), soil stresses, soil compaction, distribution of stresses in soil due to external loads, consolidation and consolidation settlement, shear strength of soils, slope stability.

Geotechnical Engineering Lab (CVE371)

Water content of soils, specific gravity, grain size distribution, consistency limits of soils, compaction test, field density test, coefficient of permeability of soils (constant and falling head), consolidation test, direct shear test, unconfined compression test, tri-axial test.

Fluid Mechanics (WEE211)

Fluid properties, basic units, fluid statics, pressure and its measurements, forces on plane and curved submerged surfaces, buoyancy & floatation. Fluids in motion, flow kinematics and visualization. Basic control volume approach, differential and integral continuity equation. Pressure variation in flowing fluids. Euler's and Bernoulli's equations. Momentum principle and its applications. Navier-Stokes equations. Energy equation, Hydraulic and energy grade lines dimensional analysis and similitude. Surface resistance and introduction to boundary layer theory. Flow in conduits, laminar and turbulent flows, frictional and minor losses, piping systems.

Hydraulics (WEE213)

Hydraulic machines, turbines, impulse turbines, Pelton wheel, reaction turbines, Francis turbine, Propeller and Kaplan turbines, water pumps, pressure pumps, centrifugal pump, multistage pump, propeller pump, and cavitations. Steady open channel flow, uniform flow, normal depth, Chezy and Manning equations, design of sections, specific energy, critical depth, nonuniform flow, rapidly varied flow, hydraulic jump, gradually varied flow, backwater curves.

Hydraulics Lab (WEE214)

Center of pressure on a plane surface, stability of a floating body, Venturi and orifice meters, impact of jets, flow over a rectangular notches, flow over a weirs, head loss through pipes, critical depth and specific energy, flow under a sluice gate, roughness of open channel, hydraulic jump, performance of impulse and reaction turbines, performance characteristics of a centrifugal pump.

Highway Engineering (CVE330)

Principles of route location. Horizontal alignment; design and setting out (circular curve element, superelevation). Sight distance; stopping and passing sight distance. Vertical alignment; design and setting out; Geometric design of intersections; highway drainage and drainage facilities.

Highway Engineering Lab (CVE331)

Tests on asphalt binders include: penetration, softening and flash points, ductility, viscosity, and specific gravity; Tests on subgrade soils include: CBR test, Test on aggregate include: sieve analysis, specific gravity, absorption, aggregate blending, Tests on hot mix asphalts include: Marshall mix design, extraction, skid resistance.

Engineering Hydrology (WEE313)

Hydrologic cycle and the hydrologic budget; Evaporation; Infiltration; Transpiration; Precipitation: point precipitation, aerial precipitation; Runoff; Hydrographs; Watershed characteristics; Introduction to statistical methods in hydrology; Frequency analysis; Aquifers; Darcy's law; Well hydraulics.

Reinforced Concrete (1) (WEE364)

Properties of concrete and steel, cracked and uncracked section analysis, strength design, stress block, design for bending and shear, singly, doubly reinforced sections, rectangular sections, and T-sections, design of continuous beams, load cases and moment envelopes, bond requirements, development length and bar cutoffs, one-way solid and one-way ribbed slabs, design of short columns.

Reinforced Concrete (2) (CVE321)

Structural layout, estimation of dead and live loads, serviceability, deflections and crack control, design for torsion, design of frames, moment redistribution, slender columns, biaxial bending of columns, design of deep beams, approximate methods for two-way slabs, design of footings detailing of reinforcement.

Steel Structures (CVE520)

Properties of structural steel, load resistant factor design (LRFD), design of tension members, design of concentric compression elements, design of beams ,beam-column elements, design of column base plates, simple welding and bolting connections.

Foundation Engineering (CVE372)

Site investigation, bearing capacity of shallow foundation, distribution of stresses in soils, settlement of shallow foundation, factors to be considered in foundation design, introduction to deep foundation, lateral earth pressure and retaining walls, sheet pile walls,

braced excavations.

Pavement Design (CVE332)

Pavement types, Pavement materials; subgrade stabilization methods; Principles of mix design using SUPERPAVE; Analysis of stresses in flexible and rigid pavement, Design methods of highway flexible and rigid pavements; Design of airport flexible and rigid pavement; Overlay design, Computer applications.

Transportation Engineering (CVE333)

Urban transportation system issues and challenges; Land use; demand forecasting; Transportation modeling including, trip generation, trip distribution, modal split, and traffic assignment. Urban mass transportation systems, Computer applications.

Engineering projects and construction management (CVE 552)

Principles of construction contracts administration. Contract ingredients, project delivery approaches, bidding procedures, contract pricing formats, contract documents, specifications, drawings, bonds, subcontracting, delays, alternative methods of dispute resolution. FIDIC Conditions of Contract for Construction.

Principles of planning, monitoring, and controlling construction projects. Developing schedules using bar charts, precedence diagrams, program evaluation and review techniques (PERT), and linear schedules. Resource histograms and s-curves. Resource allocation and resource leveling. Schedule constraints. Earned value concept.

Wastewater Engineering (CVE 10)

Definition of pollutions as applied to water, soil and air; Basic concepts in environmental chemistry, microbiology and biochemistry; water sources; chemical, physical and biological water quality and water quality parameters; standards and criteria; population estimation; stream pollution, organic loading and oxygen depletion model; process kinetics and reactor types: CSTR, plug flow and batch reactors; continuity equation and mass balance approach; introduction to unit process and operations used in water and wastewater treatment plants

Wastewater Engineering Lab (CVE 511)

Water and Wastewater analysis: acidity, alkalinity, chloride, hardness, Ammonia, dissolved oxygen; biochemical oxygen demand, chemical oxygen demand, coliform bacteria, solids determination, coagulation, and softening.

Environmental Engineering (CVE512)

Quantities and units; environmental systems and transformation processes; material balance relationships and reactor concepts; energy fundamentals; thermodynamics and equilibrium constants; environmental chemistry: stoichiometry, chemical equilibria, and organic chemistry; transport processes; interphase mass transfer; interphase partition phenomena: fugacity and mass transfer; water pollution; air pollution; basic environmental microbiology; mathematics of growth.

Engineering Economics (IE 371)

Major elements of feasibility studies. Principles of engineering Economy. Equivalence and compound interest formula. Single payment model. Uniform payment model. Gradient payment model. Exponential payment model. Decision criteria for single and multiple alternatives: present worth, annual worth, future worth, internal rate of return, benefit cost ratio, and payback methods.

Reinforced Concrete (3) (CVE422)

Design of slabs using the ACT building code, Direct Design Method, Equivalent Frame Method, design of bearing walls, shear walls and basement walls, biaxial bending of columns, torsion, design of staircases and water tanks, estimation of wind loads and earthquake loads.

Pre-stressed Concrete (CVE421)

Introduction to pre-stressed concrete, types and concepts of pre-stressed concrete, pre-stressing methods, types of concrete and pre-stressing steel, flexural analysis using elastic stresses, flexural strength analysis, partial pre-stressing. Flexural design of beams, beams design with load balancing. Design based on strength requirements, flexural crack control, loss of pre-stress force, composite beams.

Construction Project Management (CVE553)

Basic concepts of construction project management. Project cost management, project quality management, project human resources management, construction safety, value engineering and project life cycle, construction process optimization.

Advanced topics in environmental engineering (CVE410)

Solid wastes, their characteristics, and components. Protection of public health, recycling, collection and transportation systems, separation, processing and conversion of municipal solid waste, disposal of solid wastes, landfills, design of landfills, leachate generation control.

Advanced topics in transportation and traffic engineering (CVE430)

Accidents and road safety. Traffic safety studies, capacity analysis of basic freeway segments, multilane, and two-lane highways, vehicle, roadway and driver characteristics, Computer applications, traffic control methods and devices; Operational considerations for safety, Roadway lighting and highway traffic noise.

Special Topics (CVE460)

Special up-to-date topics in one of the civil engineering streams (i.e., structures, construction engineering and management, water and environmental engineering, highway and traffic engineering).

Practical Training (CVE567)

Eight weeks of practical training at a civil engineering organization. Prior consent of the department is required.

Graduation Project (1) (CVE568)

Undertaking a project within one of the streams of civil engineering such as structures,

construction engineering and management, highway and traffic engineering, and water and environmental engineering.

Graduation Project (2) (CVE569)

Continuation of graduation project 1.