جامعة عمان العربية
AMMAN ARAB UNIVERSITY

College of Engineering

Department of Civil Engineering

B.S. Study Plan

Major: Civil Engineering

Academic Year: 2025 /2026

Study Plan Credit hours (**162**) Type of Program: **Blended**

Major Type: ☐Humanities ☒Scientific/Technical ☐Science Medical

Teaching Type	Percentage of study plan hours/number	Actual Ratio
Complete Online E-Learning	10% - 20% Maximum	17
Blended learning (for scientific majors)	30% - 50% Maximum	41
Face-to-face learning (for scientific majors)	30% Minimum	42

Note: The learning types of the courses are disseminated at all academic levels in the program

Department Vision

Entrepreneurship and distinction in civil engineering, teaching, research, and application locally and regionally.

Department Mission

Generate and graduate staff of engineers who are able to compete in the job market with high professionalism, supported by the skills, knowledge and ethics of the profession, and employing them in achieving comprehensive and sustainable development.

Program Mission

To provide distinguished academic programs in the field of civil engineering supported by the knowledge, skills and ethics of the profession through qualified staff capable of keeping up with local and international standards in accordance with the E-learning integration standards.

Program Educational Objectives

1. Contribute effectively to societies, through the gained technical, analytical, and managerial skills, and be up to date with the latest technologies and innovations in Civil engineering areas, including the development of sustainability factors.
2. Be motivated and self-confident toward life-long learning, practicing, and developing their knowledge through a professional career path, pursuing higher education and scientific research in advanced areas of Civil Engineering to produce solutions for complex engineering problems.
3. Practice professional competence ethically, and apply leadership principles through commitment, teamwork, and skills of communication to empower advancements in their career.

Student Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.

4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Plan Contents

The study plan for a bachelor's degree consists of a major in Civil Engineering of (162) credit hours disseminated as follows:

Sequence	Classification	Credit Hours	Percent %
1st	University Requirements	27	16.67
2nd	College Requirements	26	16.05
3rd	Program Requirements	109	67.28
Total		162	100%

Coding System Approved by the University

6	0	2	x	x	X
Faculty Code	Program Code		Knowledge Domain	Course Level	Sequence
Engineering	Civil Engineering				

Knowledge Areas

Domain Code	Cognitive Domain	Credit Hours
1	Mathematics and Sciences	30
2	Basic Engineering Sciences	10
3	Basics of Civil Engineering	12
4	Engineering Mechanics	12
5	Structures	16
6	Water and Environment	11
7	Transportation	7
8	Geotechnical	7
9	Project Management	15
1-9	Program Elective Course (Includes all Knowledge Areas)	15

First:University Requirements: (27) Credit Hours

A. **Compulsory Requirements:** (18) Credit Hours

Teaching type			Course Number	Course Title	Credit Hours*	Pre-Requisite
Online E-Learning	Blended	Face-to-Face				
✓			50511104	Communication Skills -Arabic Language (1)	3	50511111
✓			50511105	Communication Skills - English Language (1)	3	50511112
✓			50511205	Life Skills and Social Responsibility	3	-
✓			50511206	National Education	3	-
✓			50511305	Innovation and Entrepreneurship	3	-
✓			50511308	Military Sciences	3	-
✓			50541209	Volunteering and community Development	0	
			Total		18	

B. **Elective Requirements**: (9) Credit Hours **from the following list:**

Teaching type			Course Number	Course Title	Credit Hours*	
Online E-Learning	Blended	Face-to-Face				Pre-Requisite
✓			50521106	Communication Skills - Arabic Language (2)	3	50511104
✓			50521107	Communication Skills -English Language (2)	3	50511105
✓			50521203	Principles of Psychology	3	-
✓			50521204	Human Rights	3	-
✓			50531101	Islamic Culture	3	-
✓			50531205	Quds and Hashemite Custodianship	3	

Teaching type			Course Number	Course Title	Credit Hours*	Pre-Requisite
Online E-Learning	Blended	Face-to-Face				
✓			50541103	Computer Skills	3	50511113
✓			50541204	Environment and Development	3	-
✓			50541206	Health and Community	3	-
✓			50541208	Introduction to Sustainable Development	3	-
✓			50541211	Introduction to Artificial intelligence	3	-
✓			50541308	Foreign language	3	-
✓			50541309	Digital Culture	3	50511113
			Total		9	

C. Remedial courses (9) Credit Hours:

Teaching type			Course No.	Course Title	Credit Hours*	Theoretical	Practical	Prerequisite
Online E-Learning	Blended	Face-to-Face						
✓			50511111	Remedial Course in Arabic	3			
✓			50511112	Remedial Course in English	3			
✓			50511113	Remedial Course in Computer Science	3			
				Total	**0**			

Second: College Requirements: (26) Credit Hours

A. **Compulsory Requirements:** (26) Credit Hours

Teaching type			Course No.	Course Title	Credit Hours*	Contact Hours		Pre-Requisite
Online E-Learning	Blended	Face-to-Face				Theoretical	Practical	
	✓		50521101	Calculus (1)	3	3	-	-
	✓		50221202	Calculus (2)	3	3	-	50521101
	✓		50551101	General Physics (1)	3	3	-	-
		✓	50551102	General Physics Lab (1)	1	-	2	50551101*
		✓	60221101	Engineering Drawings	2	-	4	-
	✓		60222102	Introduction to Engineering	1	1	-	-
	✓		60224203	Engineering Economics	3	3	-	50521101
		✓	60331204	Engineering Workshops	1	-	2	-
		✓	60363206	Programming for engineers using artificial intelligence	3	3	-	50511113
	✓		60372201	Communication Skills and Professional Ethics	3	3	-	50511105
	✓		60375102	Project Management	3	3	-	60224203
			Total		**26**	22	8	

* **Credit Hours**

Third: Program Requirements (109) Credit Hours

A. Compulsory Requirements: (74) Credit Hours

Teaching type			Course No.	Course Title	Credit Hours*	Contact Hours		Pre-Requisite
Online E-Learning	Blended	Face-to-Face				Theoretical	Practical	
	✓		60232101	Surveying	3	3	-	50521101
		✓	60232102	Surveying Lab.	1	-	2	60232101*
	✓		60232103	Engineering Geology	3	3	-	-
	✓		60232204	Materials Science	3	3	-	50551103
		✓	60234105	Civil Engineering Drawings	2	-	4	60221101
		✓	60241201	Statics	3	3	-	50551101
		✓	60242102	Strength of Materials	3	3	-	60241201
	✓		60242203	Dynamics	3	3	-	60241201
		✓	60243104	Fluid Mechanics	3	3	-	60242203
		✓	60264103	Fluid Lab.	1	-	2	60243104*
	✓		60252101	Concrete Technology	3	3	-	50551103
		✓	60252102	Concrete Technology Lab.	1	-	2	60252101*
		✓	60252203	Structural Analysis (1)	3	3	-	60242102
		✓	60253104	Structural Analysis (2)	3	3	-	60252203
		✓	60253205	Reinforced Concrete Design (1)	3	3	-	60253104*
		✓	60254106	Steel Structures	3	3	-	60252203
		✓	60264102	Hydraulics	3	3	-	60243104
		✓	60263201	Hydrology	3	3	-	60243104

Teaching type			Course No.	Course Title	Credit Hours*	Contact Hours		Pre-Requisite
Online E-Learning	Blended	Face-to-Face				Theoretical	Practical	
	✓		60264204	Water and Environmental Engineering	3	3	-	50551103
		✓	60264205	Environmental Engineering Lab.	1	-	2	60264204*
		✓	60273201	Highway and Traffic Engineering	3	3	-	60232101
		✓	60274102	Pavement Design	3	3	-	60273201 or 60283101
		✓	60274103	Pavement Lab.	1	-	2	60274102*
		✓	60283101	Soil Mechanics	3	3	-	60232103
		✓	60283102	Soil Mechanics Lab.	1	-	2	60283101*
		✓	60284203	Foundation Engineering	3	3	-	60283101
		✓	60294302	Civil Engineering Practical Training	3	3	-	Completion of 115 Cr. Hrs.
	✓		60295101	Contracts, Specifications and Quantity Surveying	3	3	-	60375102
		✓	60295103	Graduation Project (1)	1	1	-	Completion of 118 Cr. Hrs.
		✓	60295204	Graduation Project (2)	2	2	-	60295103
			Total		**74**	**66**	**16**	

* **Credit Hours**

B. Elective Requirements: (12) Credit Hours

Knowledge fields	Teaching type			Course No.	Course Title	Credit Hours*	Contact Hours		Pre-Requisite
	Online E-Learning	Blended	Face-to-Face				Theoretical	Practical	
Basics of civil engineering		✓		60234206	Computer Applications in Civil Engineering	3	-	3	60253104+ 60253205
		✓		60235107	Special Topics in civil engineering	3	3	-	-
		✓		60235108	Selected Topics in Civil Engineering and Artificial Intelligence Applications	3	3	-	-
Structural engineering		✓		60254107	Reinforced Concrete Design (2)	3	3	-	60253205
		✓		60254208	Seismic Engineering	3	3	-	60253104
		✓		60254209	Bridge Engineering	3	3	-	60273201
		✓		60254210	Pre-Cast Concrete	3	3	-	60253205
		✓		60254211	Pre-Stressed Concrete	3	3	-	60253205
		✓		60254212	High Rise Building	3	3	-	60253104+ 60254106
Environmental and water engineering		✓		60264206	Environmental Impact Assessment (EIA)	3	3	-	60264204
		✓		60264207	Waste Water Treatment	3	3	-	60264204
		✓		60264208	Solid Waste Management	3	3	-	60264204
		✓		60264209	Hydraulic Structure	3	3	-	60263201

Knowledge fields	Teaching type			Course No.	Course Title	Credit Hours*	Contact Hours		Pre-Requisite
	Online E-Learning	Blended	Face-to-Face				Theoretical	Practical	
Traffic engineering		✓		60274204	Pavement Management Systems	3	3	-	60274102
		✓		60274205	Airport and Railway Engineering	3	3	-	60273201
		✓		60274206	Traffic Accidents Analysis	3	3	-	60273201
Geotechnical engineering		✓		60284204	Earth Retaining Structures	3	3	-	60283101
		✓		60284205	Soil Stability and Reinforcement	3	3	-	60283101
		✓		60284206	Rock Mechanics	3	3	-	60283101
Project management		✓		60295105	Project Planning and Scheduling	3	3	-	60375102
		✓		60295106	Building Construction	3	3	-	60375102
		✓		60295107	Construction Methods	3	3	-	60375102
Surveying		✓		60234207	Remote Sensing	3	3	-	60232101
		✓		60234208	Geographical Information System	3	3	-	60232101
		✓		60234209	Advanced Surveying	3	3	-	60232101
				Total		**15**	**15**		

* **Credit Hours**

C. Ancillary Courses (20) Credit Hours:

Teaching type			Course No.	Course Title	Credit Hours*	Contact Hours		Pre-Requisite
Online E-Learning	Blended	Face-to-Face				Theoretical	Practical	
	✓		50212104	Linear Algebra (1)	3	3	-	50521101
		✓	50222209	Differential Equations (1)	3	3	-	50221202
	✓		50223111	Numerical Analysis (1)	3	3	-	50521101
	✓		50531100	Principles of Statistics and Probability	3	3	-	-
		✓	50551103	General Chemistry	3	3	-	-
		✓	50551104	General Chemistry Lab.	1	-	2	50551103 *
	✓		50551201	General Physics (2)	3	3	-	50551101
		✓	50551202	General Physics Lab. (2)	1	-	2	50551201 *
			Total		**20**	18	4	

* Credit Hours

Fourth: Free course: (3) Credit Hours

Teaching type			Course No.	Course Title	Credit Hours*	Contact Hours		Pre-Requisite
Online E-Learning	Blended	Face-to-Face				Theoretical	Practical	
				Elective Course	**3**	**3**		

* Credit Hours

Guidance plan

First Year

First Semester					
Course No.	**Course Title**	**Type of Learning**	**Credit Hours***	**Prerequisite**	**Co-requisite**
50521101	Calculus (1)	Blended	3	-	-
50551101	General Physics (1)	Blended	3	-	-
50551102	General Physics Lab. (1)	Face-to-Face	1	-	50551101
50551103	General Chemistry	Face-to-Face	3	-	-
50551104	General Chemistry Lab.	Face-to-Face	1	-	50551103
---	Compulsory/ Elective University Requirement	Online E-Learning	3	-	-
---	Compulsory/ Elective University Requirement	Online E-Learning	3	-	-
Total			17		

Second Semester					
Course No.	Course Title	Type of Learning	Credit Hours*	Prerequisite	Co-requisite
50551201	General Physics (2)	Blended	3	50551101	-
50551202	General Physics Lab. (2)	Face-to-Face	1	-	50551201
50221202	Calculus (2)	Blended	3	50521101	-
60221101	Engineering Drawings	Face-to-Face	2	-	-
60241201	Statics	Face-to-Face	3	50551101	-
60221202	Introduction to Engineering	Blended	1	-	-
---	Compulsory/ Elective University Requirement	Online E-Learning	3	-	-
Total			**16**		

Second Year

First Semester

Course No.	Course Title	Type of Learning	Credit Hours*	Prerequisite	Co-requisite
60331204	Engineering Workshops	Blended	1	-	-
60232101	Surveying	Blended	3	50521101	-
60232102	Surveying Lab.	Face-to-Face	1	-	60232101
50531100	Principles of Statistics and Probability	Blended	3	-	-
60242102	Strength of Materials	Face-to-Face	3	60241201	-
60252101	Concrete Technology	Blended	3	50551103	-
60252102	Concrete Technology Lab.	Face-to-Face	1	-	60252101
---	Compulsory/ Elective University Requirement	Online E-Learning	3	-	-
Total			18		

Second Semester

Course No.	Course Title	Type of Learning	Credit Hours*	Prerequisite	Co-requisite
60232103	Engineering Geology	Blended	3	-	-
50212104	Linear Algebra (1)	Blended	3	50521101	-
60232204	Materials Science	Blended	3	50551103	-
60242203	Dynamics	Face-to-Face	3	60241201	-
60252203	Structural Analysis (1)	Face-to-Face	3	60242102	-
---	Compulsory/ Elective University Requirement	Online E-Learning	3	-	-
Total			18		

Third Year

First Semester					
Course No.	**Course Title**	**Type of Learning**	**Credit Hours***	**Prerequisite**	**Co-requisite**
60372201	Communication Skills and Professional Ethics	Blended	3	50511105	-
60243104	Fluid Mechanics	Face-to-Face	3	60242203	-
60264103	Fluid Lab.	Face-to-Face	1	-	60243104
60253104	Structural Analysis (2)	Face-to-Face	3	60252203	-
60283101	Soil Mechanics	Face-to-Face	3	60232103	-
60283102	Soil Mechanics Lab.	Face-to-Face	1	-	60283101
50223111	Numerical Analysis (1)	Blended	3	50521101	-
Total			17		

Second Semester					
Course No.	**Course Title**	**Type of Learning**	**Credit Hours***	**Prerequisite**	**Co-requisite**
60264102	Hydraulics	Face-to-Face	3	60243104	-
60253205	Reinforced Concrete Design (1)	Face-to-Face	3		60253104
60363206	Programming for engineers using artificial intelligence	Face-to-Face	3	50511113	-
60273201	Highway and Traffic Engineering	Face-to-Face	3	60232101	-
---	Compulsory/ Elective University Requirement	Online E-Learning	3	-	-
---	Compulsory/ Elective University Requirement	Online E-Learning	3	-	-
Total			18		

* Or Co-requisite

Fourth Year

First Semester					
Course No.	**Course Title**	**Type of Learning**	**Credit Hours***	**Prerequisite**	**Co-requisite**
60263201	Hydrology	Face-to-Face	3	60243104	-
60254106	Steel Structures	Face-to-Face	3	60252203	-
60234105	Civil Engineering Drawings	Face-to-Face	2	60221101	-
60274102	Pavement Design	Face-to-Face	3	60273201+ 60283101	-
60274103	Pavement Lab.	Face-to-Face	1	-	60274102
---	Elective Department Requirement	Blended	3	-	-
Total			**15**		

Second Semester					
Course No.	**Course Title**	**Type of Learning**	**Credit Hours***	**Prerequisite**	**Co-requisite**
50222209	Differential Equations (1)	Blended	3	50221202	-
60264204	Water and Environmental Engineering	Blended	3	50551103	-
60264205	Environmental Engineering Lab.	Face-to-Face	1	-	60264204
60224203	Engineering Economics	Blended	3	50521101	-
60284203	Foundation Engineering	Face-to-Face	3	60283101	-
---	Elective Department Requirement	Blended	3	-	-
Total			**16**		

Summer Semester					
Course No.	Course Title	Type of Learning	Credit Hours*	Prerequisite	Co-requisite
60294302	Civil Engineering Practical Training	Face-to-Face	3	Completion of 115 Credit Hours*	-
Total					

- Practical training for eight consecutive weeks

Fifth Year

First Semester

Course No.	Course Title	Type of Learning	Credit Hours*	Prerequisite	Co-requisite
60375102	Project Management	Blended	3	60224203	-
60295103	Graduation Project (1)	Face-to-Face	1	Completion of 118 Credit Hours*	-
---	Elective Department Requirement	Blended	3	-	-
---	Elective Department Requirement	Blended	3	-	-
---	Compulsory/ Elective University Requirement	Online E-Learning	3	-	-
Total			13		

Second Semester

Course No.	Course Title	Type of Learning	Credit Hours*	Prerequisite	Co-requisite
60295204	Graduation Project (2)	Face-to-Face	2	60295103	-
60295101	Contracts, Specifications and Quantity Surveying	Blended	3	60375102	-
---	Elective Department Requirement	Online E-Learning	3	-	-
---	Compulsory/ Elective University Requirement	Online E-Learning	3	-	-
Total			11		

كلية الهندسة College of Engineering

جامعة عمان العربية AMMAN ARAB UNIVERSITY

Courses Tree

Collage: Engineering | **Department: Civil Engineering**

Specialty: Civil Engineering | **Program: Bachelor** | **Issue Date: 2024/2025**

Course Description

Course Number Course Title Credit Hours Prerequisite Condition Type of Learning

60221101 Engineering Drawings 2 Credit hrs. Prerequisite: None Condition: None Type of Learning: Face to Face

Instruments of drawing. Drawing basic engineering shapes. Graphic geometry (Lines, letters, numbers). Types of projections. Drawing isometric shapes 3D. Drawing Plans, frontages and plan sectioning.

60221202 Introduction to Engineering 1 Credit hrs. Prerequisite: None Condition: None Type of Learning: Blended

History of engineering. Difference between science and engineering. Development of engineering. Majors of engineering. Engineering in Islam. Famous Muslim engineers. Characteristics of successful engineer. Functions of engineering. Jordanian Engineering Association. The effect of technology to engineering. Other topics include goal setting and career assessment, ethics, public safety, the engineering method and design process.

60224203 Engineering Economics 3 Credit hrs. Prerequisite: 50521101 Condition: Register Type of Learning: Blended

Principles of engineering economy and general definitions. Definition of engineering economy, Cash flow, time value of money and others. Types of cash flows and payments. Simple & compound interest rate, interest tables. Equivalence relations on the cash flow. Relation between present and future amounts. Present value analysis. Exclusive projects and alternatives. Compare alternatives and select the best one using present worth method, annual worth method and rate of return method,

60363206 Programming for engineers using artificial intelligence 3 Credit hrs. Prerequisite: 50511113 Condition: Register Type of Learning: Face-to-Face

This course provides students with foundational knowledge of computer systems and modern engineering software, and covers the core concepts of artificial intelligence and intelligent algorithms, along with their applications in analyzing, designing, and developing engineering solutions. The course also enhances students' skills in digital simulation, computational thinking, and the utilization of intelligent technologies to create more efficient and sustainable engineering solutions.

60372201 Communication Skills and Professional Ethics 3 Credit hrs. Prerequisite: 50511105 Condition: Register Type of Learning: Blended

General ideas about the writing styles and forms. Writing in business, industry and government. Adequacy and excellence. Analyzing the communication context. Basic writing techniques. Types of written communication. Revising for excellence. College writing and professional writing. Major types of on-job writing. Writing categories. Report writing procedures. Preparing own resumes. Practical experience on how to perform and attend interviews of work.

60375102 Project Management 3 Credit hrs. Prerequisite: 60224203 Condition: Pass Type of Learning: Blended

General definitions in project management like management, project, and project manager. Definition of Project lifecycle. Techniques for project planning and scheduling, Gantt chart, activity on arrow and activity on node using CPM method. Scheduling using PERT. Crashing project time. Limited and non-limited resources allocation. Controlling and project monitoring.

60331204 Engineering Workshops 1 Credit hrs. Prerequisite: None Condition: None Type of Learning: Face to Face

It includes theoretical and practical topics covering four workshops: Welding workshop (including types of welding, general conditions to be provided, types of welding wires, qualification, prevention and public safety). Electrical workshop (including types of electrical circuits, household electrical wires, estimation of electric current and resistance). Blacksmithing workshop (tools and their types in perforating, filing and turning, leveling and sharpening metals). Carpentry workshop (including types of woods, machines and tools used in cutting, drilling, fixing and joining woods together).

60232204 Materials Science 3 Credit hrs. Prerequisite: 50551103 Condition: Register Type of Learning: Blended

Historical perspective. Classification of materials. Atomic structure and interatomic bonding. The structure of crystalline solids. Imperfections in solids. Mechanical properties of metals. Failure. Phase diagrams. Polymer structures, mechanical behavior and thermal properties.

60232101 Surveying 3 Credit hrs. Prerequisite: 50521101 Condition: Register Type of Learning: Blended

Introduction to surveying fundamentals. Units of measurements and scales. Chain surveying. Leveling and its application in contouring, profiles and cross-sections. Areas. Volumes. Earthwork calculations. Theodolite and its application in measurement of angles. Traverse surveys. Traverse coordinate calculations. Theory of errors and adjustments. Introduction to Total station.

60232102 Surveying Lab. 1 Credit hrs. Prerequisite: 60232101* Condition: Register Type of Learning: Face to Face

Using traditional surveying equipment like chain and measuring tape. Leveling. Countering. Cross and longitudinal sections. Measuring vertical and horizontal angles using Theodolite. Use of Total Station.

60232103 Engineering Geology 3 Credit hrs. Prerequisite: None Condition: None Type of Learning: Blended

Identification of rock and minerals types. Soil properties. Weathering. Basic principles of the physical and structural geology of soils with emphasis related to civil engineering. Active tectonics and earthquakes hazards. Ground water. Slope stability and landslides.

60234105 Civil Engineering Drawings 2 Credit hrs. Prerequisite: 60221101 Condition: Register Type of Learning: Face to Face

Basic skills in construction drawing. Main symbols and terminology used in plans. Definition of methods for drawing and dropping civil structures and construction elements such as stairs, types of slabs, sections in walls and slabs, beams, ribs, footings, retaining walls, culverts, irrigation canals and road, types of intersections. Drawing contour lines and contour maps, drawing a project profile and show the cut and fill areas. Drawing plans.

60241201 Statics 3 Credit hrs. Prerequisite: 50551101 Condition: Register Type of Learning: Face to Face

Introduction to static forces and Newton's laws, SI units. Statics of particles, resultant of forces in 2D (planar) and 3D (space) equilibrium and free-body concept. Statics of rigid bodies, moments, force couples and equivalent force systems. Equilibrium of rigid bodies. Centers of gravity and centroids. Analysis of statically determinate structures including trusses, beams, frames etc. Distributed forces. Axial force, shear force and bending moment diagrams, Moment of inertia of combined shapes.

60242102 Strength of Materials 3 Credit hrs. Prerequisite: 60241201 Condition: Register Type of Learning: Face to Face

Concepts and types of stresses and strains. Stress-strain diagram. Mechanical properties of materials (modulus of elasticity, Poisson's ratio, and shear modulus). Axial (stress, strain, deformation, and compatibility). Internal forces for beams (axial, shear, and bending moment diagrams). Bending and shear stress. Torsional stresses, strains, and deformations. Compound stresses and strains. Maximum and minimum stresses and strains. Mohr circle. Buckling of compression members (Euler differential equation). Deflection of beams by double integration method.

60242203 Dynamics 3 Credit hrs. Prerequisite: 60241201
Condition: Register Type of Learning: Face to Face

Study the motion of transition and rotational bodies with and without acting forces. Newton's second law. Central movement of forces. Equation of energy. Work. Momentum. Collision. Conservation of energy and momentum. Applications on the motion systems. Acceleration and relative speed. Nonlinear center.

60243104 Fluid Mechanics 3 Credit hrs. Prerequisite: 60242203
Condition: Register Type of Learning: Face to Face

Fluid properties. Basic units. Fluid statics. Pressure and its measurements. Forces on plane and curved submerged surfaces. Buoyancy. Fluids in motion. Flow kinematics. Basic control volume approach. Differential and integral continuity equation. Euler's and Bernoulli's equations. Applications of Bernoulli equation. Hydraulic and energy grade lines. Momentum principle and its applications, Navier-Stokes equations. Dimensional analysis and simulation. Surface resistance. Introduction to boundary layer theory. Flow in conduits. Laminar and turbulent flows.

60264103 Fluid Lab. 1 Credit hrs. Prerequisite: 60243104*
Condition: Register Type of Learning: Face to Face

Center of pressure on a plane surface. Stability of a floating body. Venturi and orifice meters. Impact of jets. Flow over a rectangular notch. Flow over a weir. 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.

60252101 Concrete Technology 3 Credit hrs. Prerequisite: 50551103 Condition: Register Type of Learning: Blended

Cement types. Manufacturing process of cement. Properties of cement. Cement hydration process. Properties of aggregates. Fresh concrete: workability, segregation and mixing tests of fresh concrete. Hardened Concrete: strength of concrete, shrinkage and creep, durability of concrete, mix design calculations, masonry units, concrete blocks and admixtures.

60252102 Concrete Technology Lab. 1 Credit hrs. Prerequisite: 60252101* Condition: Register Type of Learning: Face to Face

Laboratory tests are conducted on concrete raw materials. Specific weight, absorption, corrosion, crushing and impact of aggregates. Setting time of cement. Drop rate, coefficient of compaction and void ratio of fresh concrete. Breaking and bending strength of both cubes and cylinders hardened concrete specimens. Non-destructive tests such as Schmidt's hammer.

60252203 Structural Analysis (1) 3 Credit hrs. Prerequisite: 60242102 Condition: Pass
Type of Learning: Face to Face

Introduction to structural forces (static, and dynamic, concentrated and distributed, nature of forces. Equilibrium and determinacy of structures. Analysis of Internal forces for determinate frames and arches (axial, shear, and bending moment diagrams). Analysis of influence lines for determinate. Force method. Virtual work method.

60253104 Structural Analysis (2) 3 Credit hrs. Prerequisite: 60252203
Condition: Register Type of Learning: Face to Face

Displacement method, Slope-deflection method. Moment-distribution method. Analysis of indeterminate structures by stiffness methods i.e. matrix method (for sway and none sway structures). Analysis of influence lines for indeterminate structure (beams, frames, arches and trusses. determination of deflection of frames and trusses. Analysis of indeterminate frame and trusses. Three-moment equation and its applications to solving indeterminate beams and frames.

60254106 Steel Structures 3 Credit hrs. Prerequisite: 60252203
Condition: Register Type of Learning: Face to Face

Introduction to the behavior and design of steel structures. Properties and codes of steel structures. Loads and design philosophies (LRFD). Design of tension members. Design of compression members (columns). Design of beams. Design of beam-columns. Design of connections.

60253205 Reinforced Concrete Design (1) 3 Credit hrs. Prerequisite: 60253104*
Condition: Register Type of Learning: Face to Face

Properties of concrete and steel materials, types of loads and loads combinations. Concept of concrete design. Serviceability stress method, cracked and un-cracked sections. Ultimate limited strength method. Design of beams. Analysis and design of singly reinforced sections, ductile, balanced, and brittle sections, doubly reinforced rectangular sections, flanged sections. Design for shear forces. Design of columns. Analysis of concentric eccentric short columns, Design of one-way slab.

60263201 Hydrology 3 Credit hrs. Prerequisite: 60243104
Condition: Register Type of Learning: Face to Face

Introduction to the hydrologic cycle and its components, Precipitation, evaporation and transpiration, infiltration, stream flow, rainfall-runoff analysis and its application, peak flow calculations, flood routing. Hydrologic forecast and design criteria, Flood estimation and control.

60264102 Hydraulics 3 Credit hrs. Prerequisite: 60243104 Condition: Register Type of Learning: Face to Face

Energy equation, friction losses, minor losses, types of pipe flow & Reynolds number, series piping, parallel piping, pump's power, unsteady pipe flow, classification of free-surface flow, Froude number, uniform flow, critical flow, basics of channel design, specific energy, non-uniform rapidly varied flow (hydraulic jump), introduction to non-uniform gradually varied flow.

60264204 Water and Environmental Engineering 3 Credit hrs. Prerequisite: 50551103 Condition: Pass Type of Learning: Blended

Introduction to environmental engineering. Causes of the deterioration of the current state of the global environment. Units and standards used in environmental sciences and engineering. Various environmental laws, standards, methods and types for evaluating the various elements of the environment and ensuring their quality (Mass and Energy Transfer; Environmental Chemistry). Water quality and properties (Water Pollution). Air Pollution and progress in controlling its quality.

60264205 Environmental Engineering Lab. 1 Credit hrs. Prerequisite: 60264204* Condition: Register Type of Learning: Face to Face

Water and Wastewater Analysis including solids determination, spectrophotometry, pH, turbidity, alkalinity, acidity, hardness, acid-base titration, biological and chemical oxygen demands, bacterial counts in water, coliform tests and heavy metals determination and trace contaminants.

60273201 Highway and Traffic Engineering 3 Credit hrs. Prerequisite: 60232101 Condition: Register Type of Learning: Face to Face

Highway types. Characteristics of road, pedestrian, vehicles and drivers. Highway classification. Design of horizontal and vertical alignments. Design of cross-section elements. Sight distance. Super elevation attainment. Highway water drainage system. Traffic flow elements: traffic volume, speed and delay studies. Traffic data collection. Travel time studies.Capacity and level of service analysis of basic highway segments. Signal timing. Two-lane highway and multilane highway free flow speed estimating.

60274102 Pavement Design 3 Credit hrs. Prerequisite: 60273201+60283101 Condition: Register Type of Learning: Face to Face

Types of pavement (flexible and rigid). Stress. Strain. Deflection analysis in flexible and rigid pavement. Soil for Highway. Design Traffic loading and volume. Equivalent single-wheel load, Structural design of flexible and rigid pavement. Pavement materials. Asphalt concrete mix design using Marshall and Superpave method (specifying optimum asphalt content). Pavement distresses.

60274103 Pavement Lab. 1 Credit hrs. Prerequisite: 60274102* Condition: Register Type of Learning: Face to Face

Highway material test. Characteristics and tests of bituminous material (asphalt). Marshall Test. CBR test.

60283101 Soil Mechanics 3 Credit hrs. Prerequisite: 60232103 Condition: Pass Type of Learning: Blended

Composition and structure of soils. Soil phases' relations and index properties. Soil classification. Soil compaction. Principle of effective stress. Stresses due to self-weight. Stresses due to applied loads. Soil permeability. Seepage: one and two dimensional, flow net. Secondary compression. Shear strength of soils.

60283102 Soil Mechanics Lab. 1 Credit hrs. Prerequisite: 60283101* Condition: Register Type of Learning: Face to Face

Specific gravity test. Dry screening using sieve analysis. Wet analysis (Hydrometer test). Water content, Atterberg Limits: Liquid limit, Plastic limit, and Shrinkage limit. Standard and modified Proctor compaction tests. In situ field test. Permeability test (constant and falling head tests), Triaxial shear test. Unconfined compression test. Direct shear test.

60284203 Foundation Engineering 3 Credit hrs. Prerequisite: 60283101 Condition: Pass Type of Learning: Face to Face

Review of basic soil mechanics. Types of shallow foundations. Bearing capacity of foundations. Settlement. Geometric design of isolated footings. Special types of footings: rectangular, combined, strap footings and mat foundations. Lateral earth pressure and retaining walls. Introduction to deep foundations.

60295101 Contracts, Specifications and Quantity Surveying 3 Credit hrs. Prerequisite: 60375102 Condition: Register Type of Learning: Blended

General engineering definitions. Definition of quantity surveying. Methods of quantity surveying. Categories & legal aspects of engineering construction works. General and special conditions of contracts FIDIC and their different types of books. Specifications of construction materials. Area and volume calculations. Quantity surveying for civil engineering works as cut and fill. Quantity measurement for different construction materials such as (Paint, panel, tiles, blocks, steel, reinforced concrete, fine and coarse concrete mixtures). Bills of quantities.

60295103 Graduation Project (1) 1 Credit hrs. Prerequisite: Completion of 118 Cr. Hrs. Condition: Pass Type of Learning: Face to Face

Directed readings in the literature of civil engineering. Introduction to research methods. Seminar discussions dealing with special engineering topics of current interest. It is the first phase of the project.

60295204 Graduation Project (2) 2 Credit hrs. Prerequisite: 60295103 Condition: Register, Type of Learning: Face to Face

The student or group of students selects a theoretical or practical project related to the cognitive domains of the civil engineering discipline. At the end of the project, the student should undertake a comprehensive examination and submit a technical report along with an illustrated presentation of the project.

60294302 Civil Engineering Practical Training 3 Credit hrs. Prerequisite: Completion of 115 Cr. Hrs. Condition: Pass Type of Learning: Face to Face

Practical training in a civil engineering project or any other places approved by the department, in accordance with regulations drafted by the training committee at the faculty of engineering.

60234206 Computer Applications in Civil Engineering 3 Credit hrs. Prerequisite: 60253104+60253205 Condition: Register Type of Learning: Blended

Practical applications in computer software that cover different disciplines in civil engineering topics.

60254107 Reinforced Concrete Design (2) 3 Credit hrs. Prerequisite: 60253205 Condition: Register Type of Learning: Blended

Design of one-way solid slabs, design of one way ribbed slab, introduction to two-way solid slab. Design of two-way slabs (solid and ribbed) by coefficient method, direct design method. Types of loads and load combination. Analysis and design of sway and no sway slender columns. Analysis of retaining walls. Calculation and check of deflection, crack width, and vibration. Analysis and design for torsion.

60254208 Seismic Engineering 3 Credit hrs. Prerequisite: 60253104 Condition: Register Type of Learning: Blended

Nature of earthquake and seismic hazard maps. Structural dynamics (single and multi-degree) response spectra. Analysis by Uniform Building Code UBC97. Analysis by International Building Code IBC. Design of beams, columns, shear walls, and joints subjected to seismic loads.

60254209 Bridge Engineering 3 Credit hrs. Prerequisite: 60273201 Condition: Register Type of Learning: Blended

Types of bridges in terms of shape and material. Bridge Design Process. Types of Superstructures. Traffic and drainage design of bridges. Loads and load combination. Material reduction factors. Design of slab bridges. Design

of T-beam bridges. Design of pre-stressed bridges. Design of steel bridges. Design of supports. Design of abutments. Maintenance of bridges.

60254210 Pre-Cast Concrete 3 Credit hrs. Prerequisite: 60253205 Condition: Register, Type of learning: Blended

Precast structures – halls, skeletons, building from flat and spatial units. Type of units (columns, roof and floor elements, wall panels). Arrangement and details of connections. Calculation of precast units and structures, joint members. Spatial rigidity of precast constructions. Special units and structures.

60254211 Pre-Stressed Concrete 3 Credit hrs. Prerequisite: 60253205 Condition: Register Type of Learning: Blended

Basic principles. Short- and long-term properties of constituent materials. Partial pre-stressing. Flexural behavior. Analysis and design of pre-stressed concrete beams. Classes. Cracking. Pre-tensioning. Post-tensioning. Service load design. Load balancing. Strength design. Strain limits. Flexural efficiency. Bond. Transfer and development lengths. Anchorage zone design. Shear and diagonal tension. Evaluation of immediate and long-term losses. Composite construction and design. Shear-friction theory. Deflection calculation using approximate single time step approach.

60254212 High Rise Building 3 Credit hrs. Prerequisite: 60253104 + 60254106 Condition: Register, Type of learning: Blended

High-rise building functional requirements as well as technologies and processes used in high-rise building construction. Topics covered in this course include foundation systems; typical vertical and horizontal loads on high-rise buildings, structural systems including structural steel construction and reinforced concrete construction; enclosure systems; material handling and management including selection of cranes, hoists, and concrete pumps; high-rise building services; and interior fit-out of high-rise buildings.

60264206 Environmental Impact Assessment (EIA) 3 Credit hrs. Prerequisite: 60264204 Condition: Register Type of Learning: Blended

The methodology of environmental impact assessment (EIA) as a vital tool for sound environmental management and decision-making. The course provides an overview of the concepts, methods, issues and various forms and stages of the EIA process. Different levels and systems of EIA are examined to highlight the diversity of approach and impact of the EIA process.

60264207 Waste Water Treatment 3 Credit hrs. Prerequisite: 60264204 Condition: Register Type of Learning: Blended

Sources of wastewater, quantities and quality. Primary treatment for removal of suspended solids. Chemical reaction and reactor type. Secondary treatment: activated sludge, trickling filters, and stabilization ponds. Management of treatment residuals. Design of sewer systems.

60264208 Solid Waste Management 3 Credit hrs. Prerequisite: 60264204 Condition: Register Type of Learning: Blended

Understand, classify and manage solid wastes. Identify of different solid waste sources. Identify the characteristics of solid waste. Suggest suitable actions and plans to handle different situations. Understand modern treatment technologies and regulations as well as sustainability of the chosen technology. Evaluate different case studies.

60264209 Hydraulic Structure 3 Credit hrs. Prerequisite: 60263201 Condition: Register, Type of learning: Blended

Design Discharge: run-off, design flood and estimation of peak flood. Seepage and uplift pressure. Hydraulic jump and energy dissipation devices: normal and sequent depths, forms, energy dissipaters and stilling basin, and U/S and D/S protections. Control structures: diversion works, weirs, sediment control devices, falls and transitions. Cross drainage works; culverts and outlet works.

60274204 Pavement Management Systems 3 Credit hrs. Prerequisite: 60274102 Condition: Register Type of Learning: Blended

The principles and practices of evaluation, analysis, design, performance prediction, planning and maintenance of highway pavements.

60274205 Airport and Railway Engineering 3 Credit hrs. Prerequisite: 60273201 Condition: Register Type of Learning: Blended

Investigation of airport location and requirements. Design of runways: orientation, lengths, and cross-sections. Design and requirements of airport terminals. Railroad engineering: cross-sections, intersection design of horizontal and vertical curves of railroad.

60274206 Traffic Accidents Analysis 3 Credit hrs. Prerequisite: 60273201 Condition: Register Type of Learning: Blended

Traffic Accident. Patterns of traffic accidents. Accident data, Analysis of accident data. Hazardous locations, Countermeasures. Accident cost. The importance of highway safety, Operational considerations for safety. Issues involved in transportation safety. Causes of crashes, Factors involved in crashes. The Highway safety improvement program. Collecting and maintaining hazardous locations and elements. Conducting engineering studies. Schedule and implement safety improvement projects. Determine the effect of highway safety improvements. Traffic control methods and devices.

60284204 Earth Retaining Structures 3 Credit hrs. Prerequisite: 60283101 Condition: Register Type of Learning: Blended

Introduction to soil mechanics to recognize, design and analyze concrete retaining walls, MSE walls, cantilever and anchored sheet pile walls. Braced excavations. Cofferdams using conventional and Load and Resistance Factor Design (LRFD) concepts.

60284205 Soil Stability and Reinforcement3 Credit hrs. Prerequisite: 60283101 Condition: Register Type of Learning: Blended

Fundamentals and advanced concepts of stability analysis for earth slopes and retaining walls with soil backfill. Topics: shear strength, effective/total stress analysis, infinite/finite slopes, reinforced soil slopes, lateral earth pressure, retaining wall design and reinforced soil retaining walls.

60284206 Rock Mechanics 3 Credit hrs. Prerequisite: 60283101 Condition: Register Type of Learning: Blended

The behavior of rocks under the influence of loading or unloading. Mechanical behavior of rock and rock masses, the engineering properties of rock and techniques for the classification of rock masses and analysis of rock structures.

60295105 Project Planning and Scheduling 3 Credit hrs. Prerequisite: 60375102 Condition: Register Type of Learning: Blended

Study of the concepts used in planning and scheduling of projects in both industrial and construction applications by using Gantt chart, CPM methods & PERT method. Principles of Cost Estimation for projects.

60295106 Building Construction 3 Credit hrs. Prerequisite: 60375102 Condition: Register Type of Learning: Blended

Identifying different methods of construction, regulations particularly the basic building stages, the organization of the site, earthworks, foundations, walls, floors, ceilings, stairs, steel, molds, scaffolding, formwork, blocks,

bricks, stone, insulation, finishing works, safety precautions & doors and windows … etc. How to set up detailed working drawings and how to choose the most suitable building materials. Review construction methods, machinery available, and the stages of construction. Physical and engineering properties of building materials, use and performance in different environments. Engineering tests required for construction materials and how they are implemented in laboratory or at site.

60295107 Construction Methods 3 Credit hrs. Prerequisite: 60375102 Condition: Register Type of Learning: Blended

Introduction to project planning and management. Integrated reading of project list of formal documents. Evaluation of the factors affecting the selection of construction equipment methods for different projects. Engineering fundamentals of excavations, moving earth and soil stabilization and compaction. General knowledge on different construction equipment such as loaders, excavator, jackhammers, scrapers, & trucks. Piles and pile driving equipment. Pumping equipment. Tunneling equipment. Design of formwork, trench support and cofferdams.

60234207 Remote Sensing 3 Credit hrs. Prerequisite: 60232101 Condition: Register Type of Learning: Blended

Introduction to remote sensing techniques. Forms of energy-material interaction. Remote sensing devices and systems. Supplies, sources and uses of remote sensing techniques. Importance of remote sensing technology in the study of geomorphology and geometry.

60234208 Geographic Information System 3 Credit hrs. Prerequisite: 60232101 Condition: Register Type of Learning: Blended

Study the fundamental of GIS. Explore the data and data entry in GIS. Data structure for GIS. Data acquisition. Data processing. Database management. Analysis and manipulation, Emphasis on product generation. Maps, projection and datum, Data management and planning.

60234209 Advance Surveying 3 Credit hrs. Prerequisite: 60232101 Condition: Register Type of Learning: Blended

Advanced topics in surveying computations and procedures, including traverse error analysis, topographic surveying, mapping, astronomical observations, coordinate geometry applications. Introduction to geodesy and state plane coordinates.

60235108 Selected Topics in Civil Engineering and Artificial Intelligence Applications, 3 Credit hrs. Type of Learning: Blended

"This course aims at introducing new developments in Artificial Intelligence not specifically covered in the curriculum and in which the instructor has developed interest and proficiency. The intention is to provide a rapid response to current trends and to widen students' knowledge in Artificial Intelligence field. Course content may vary each offering or may be repeat.

60235107 Special Topics in Civil Engineering, 3 Credit hrs. Type of Learning: Blended

"Special Topics in Civil Engineering" offer students a unique opportunity to explore specialized areas of interest within various knowledge areas, and latest trends in Civil Engineering, equipping them with the knowledge, and skills essential for addressing complex challenges in Civil Engineering.