Al-Hussein Bin Talal University

Faculty of Engineering

Department of Civil Engineering

Study plan

2017

An Overview

Civil Engineering is one of the Applied Engineering branches concerned with engineering design projects and the infrastructures that serve people, such as buildings, roads, water and water recycling systems, bridges, tunnels, dams, railroads, etc. The department, which employees well-qualified faculty members with many years of experience, is committed to preparing the students for tomorrow's world.

Vision

Department of Civil Engineering aims at becoming a leading and active center of Civil Engineering science at both national and international levels. The department also seeks excellence in teaching, research and public services.

Mission

The mission of the Department of Civil Engineering stems from AHU mission, which aims at providing a high quality educational, professional, and intellectual experience that enables students, faculty, and staff to contribute to society through teaching, research, practice and service.

Objectives

Upon graduation, our students are expected to be able to:

- Apply the theoretical knowledge that they have acquired in Mathematics, Science, and Engineering in their future engineering careers.
- Design and perform data analysis tests related to civil and environmental engineering.
- Design systems that are able to perform the desired goals in their jobs.
- Identify and analyze civil and environmental problems and provide appropriate solutions for them.
- Work individually and/or with groups of multiple-specializations.
- Understand their professional and ethical responsibilities, and anticipate the duties that they have to perform.
- Possess strong written and oral communication skills in Arabic and English.
- Understand the impact of the engineering solutions on the community and the world.
- Acknowledge the necessity of the continuing education and personal and professional development.
- Aware of the contemporary engineering issues.
- Use the modern engineering tools, skills and techniques in their careers.

Outcomes

Students, who complete the requirements for the Bachelor of Science in Civil Engineering, as administered by the faculty of the Department of Civil Engineering at Al-Hussein Bin Talal University (AHU), are expected, as a minimum, to have:

1. An ability to utilize mathematics, general scientific principles, and computer applications and tools for solving practical Civil Engineering problems.
2. Fundamental design skills and an ability to conduct experiments, and interpret as well as analyze the collected data and come up with conclusions.
3. An ability to analyze and design systems, components or processes relevant to meet the desired needs.
4. Ability present technical information clearly in both oral and written formats and to communicate effectively both orally and in writing with those inside and outside civil engineering.
5. An awareness of computing profession and its impact in the context of science, society and technology.
6. An ability to tolerate diversity by attaining certain skills, necessary morals and ethical convictions to function and work effectively in multidisciplinary teams.
7. An ability to realize that explosion growth in the field of Civil Engineering, so they should engage in life-long learning process for a successful career in Civil Engineering field.
8. Knowledge of contemporary issues in the field of Civil Engineering.
9. An understanding of professional and ethical responsibilities as an engineer in the field.
10. Hands-on experience with modern engineering tools, software, instrumentation relevant to Civil Engineering practice and infrastructures.
11. The capacity to profoundly accent the economy by contributing to base-level production of goods and services.

UNDERGRADUATE CURRICULUM

☞ *COURSE NUMBERING SYSTEM:*

A seven-digit number of the format **FFDDLKS** is used to designate courses according to the following table:

Faculty	Department	Level (or Year)	Knowledge Field	Sequence
Two digits (FF)	Two digits (DD)	One digit (L)	One digit (K)	One digit (S)

The Faculty of Engineering has the code (**05)**. The Department codes at the Faculty are given in the following table:

Code	Department	Code	Department
01	Mining Engineering	05	Communications Engineering
02	Environmental Engineering	06	Computer Engineering
03	Chemical Engineering	07	Mechanical Engineering
04	**Civil Engineering**	08	Electrical Engineering

Therefore, Civil Engineering courses will have numbers of the form **0504LKS**, where the codes L, K and S are described as in the following **example:**

Static (1) (0504102)						
0	5	0	4	1	0	2
Faculty		**Department**		**Level/Year**	**Field**	**Sequence**

No.	Field
0	General
1	Construction
2	Soil Mechanics and Foundations
4	Highway and Transportation Engineering
5	Materials
6	Water and Environment
7	Construction Management
8	Field Training and Special Topics
9	Graduation Projects

☞*Specialization:*

The Department of Civil Engineering offers the Bachelor of Science (B.Sc.) degree in Civil Engineering after successfully passing 160 credit hours.

☞*Degree Requirements:*

A Bachelor of Science degree in Civil Engineering at Al-Hussein Bin Talal University (AHU) is awarded in accordance with the Statute stated in the AHU regulations for B.Sc. awarding issued by the Deans' council for awarding scientific degrees and certifications at AHU, and after the successful completion of 160 credit hours, distributed as indicated in the following Table.

☞*Framework for B.Sc. Degree (160 Semester Credits)*

Classification	Credit Hours		
	Compulsory	Elective	Total
University Requirements	**12**	**15**	**27**
College Requirements	**28**	**-**	**28**
Department Requirements:	**96**	**9**	**105**
Free Electives	**-**	**-**	**-**
Total =	**136**	**24**	**160**

☞*UNIVERSITY REQUIREMENTS: (27 Credit Hours)*

University requirements consist of 27 credit hours split into 12 compulsory credit hours and 15 elective credit hours.

- **Compulsory University Requirements: (12Credit Hours)**

Course No.	Course Title	Cr. Hr.	Lecture	Lab.	Prerequisite or *Co-requisite
0201099	Arabic Language Placement Test[1]	-	-	-	-
0612099	Computer Skills Placement Test[2]	-	-	-	-
0202099	English Language Placement Test[3]	-	-	-	-
0205100	National Education	3	3	-	-
0100102	Military Sciences[4]	3	3	-	-
0201101	Arabic Language (1)	3	3	-	0201099
0202101	English Language (1)	3	3	-	0202099
	Total=	**12**			

According to the university regulations:-

1. A student who undergoes the English Language Placement Test and obtains a grade of:
   - 84% or greater is exempted from the Remedial English Language course (0202099) and the English Language course (0202101) is assigned "PASS".
   - 50% to 83.9% is exempted from (0202099) and must study the 0202101 course.
   - less than 50% (fail) will have to undertake (0202099) prior to (0202101) as a pre-requisite.
2. A student who undergoes the Arabic Language Placement Test and obtains a grade of:
   - 84% or greater is exempted from the Remedial Arabic Language (0201099) and the Arabic Language course (0201101) course is assigned "PASS".
   - 50% to 83.9% is exempted from (0201099) and must study the 0201101 course.
   - less than 50% (fail) will have to undertake (0201099) prior to (0201101) as a pre-requisite.
3. A student who undergoes the Computer Skills Placement Test and obtains a grade of:
   - 50% or more (pass) is exempted from the Remedial Computer Skills course (0612099).
   - less than 50% (fail) will have to undertake (0612099).

   NOTE: the three remedial courses mentioned above are assigned zero credit hours each
4. The Military Sciences course is compulsory for Jordanian students only. Students of other nationalities are not required to undertake it. This course is graded on a Pass/Fail basis. Students graduating from Royal Military faculty, military schools and equivalent institutes are exempted from studying this course.

❖ **Elective: (15 Credit Hours)**

Elective Courses with Total of (15) Credit Hours. Student must select 15 credit hours from of the following modules:

- **Humanities**

Course No.	Course Title	Cr.Hr.	Theory	Practical	Pre-requisites
0204101	French Language	3	3	-	-
0206101	Introduction to Library Science	3	3	-	-
0213101	Islamic Culture	3	3	-	-
0201102	Communication skills in Arabic	3	3	-	0201101
0202102	Communication skills in English	3	3	-	0202101
0201104	Art of writing and expression	3	3	-	-
0113112	Principles of Psychology	3	3	-	-
0102141	Principles of Education	3	3	-	-
0100171	Principles of Physical Education	3	3	-	

- **Social Sciences and Economy**

Course No.	Course Title	Cr.Hr.	Theory	Practical	Pre-requisites
0701100	Jordan's Contribution to the Human Civilization	3	3	-	-
0412100	Economy in Our Life	3	3	-	-
0408100	Law in our life	3	3	-	-
0217100	History of Jerusalem	3	3	-	-
0411102	Principles of Management	3	3	-	-
0411104	Leadership and Innovation	3	3	-	-
0701105	Cultural Heritage and People	3	3	-	-
0712107	Hospitality and Tourism	3	3	-	-
0211107	Geography of Jordan	3	3	-	-
0441110	Principles of e-commerce	3	3	-	-

- **Science, Technology, Agriculture, and Health**

Course No.	Course Title	Cr.Hr.	Theory	Practical	Pre-requisites
0303100	Introduction of Astronomy	3	3	-	-
0502100	Environmental Issues	3	3	-	-
0612100	Internet skills and social networking sites	3	3	-	-
0903100	Security and Radiation Safety	3	3	-	-
0613100	Principles of e-government	3	3	-	-
0302100	History of Mathematics	3	3	-	-
0503100	Principles of public safety	3	3	-	-
0507100	Principles of car Maintenance	3	3	-	-
0501110	Natural Resources in Jordan	3	3	-	-
0306111	Chemistry and Human	3	3	-	-
0901120	First Aid	3	3	-	-
0901160	Principles of public Health	3	3	-	-

☞ *FACULTY REQUIREMENTS: (28Credit Hours)*

The Faculty of Engineering requirements consist of 28Credit Hours distributed as follows:

Course No.	Course Title	Cr. Hr.	Lec Hr.	Lab. Hr.	Prerequisite or *Co requisite
0501100	Introduction to Engineering	1	1	-	
0302101	Calculus (1)	3	3	-	-
0303101	General Physics (1)	3	3	-	
0302102	Calculus II	3	3	-	0302101
0303102	General Physics (2)	3	3	-	0303101
0303103	General Physics Lab (1)	1	-	3	0303101
0303104	General Physics Lab (2)	1	-	3	0303102
0612114	C++ Programming Language	3	3	-	0612099

0502200	Numerical Analysis for Engineers	3	3	-	0302203
0507231	Engineering Drawing	2	-	6	0612099
0507291	Engineering Workshops	1	-	3	
0502300	Communication Skills	1	-	-	0202101
0501454	Engineering Economy	3	3	-	0302102
	Total	**28**			

☞ *DEPARTMENT REQUIREMENTS (96 Credit Hours)*

Department requirements consist of 105 credit hours split into 96 compulsory credit hours and 9 elective credit hours.

❖ Department Core: (96 Credit Hours)

Course No.	Course Title	Cr. Hr.	Lec Hr.	Lab. Hr.	Prerequisite or *Corequisite
0306101	General Chemistry (1)	3	3	-	
0504102	Statics	3	3	-	0303101
0306103	General Chemistry lab (1)	1	-	3	0306101
0302203	Deferential Equations (I)	3	3	-	0302102
0504204	Probability and Engineering statistic	3	3	-	0302102
0507212	Dynamic	3	3	-	0504102
0501213	Engineering Geology	3	3	-	0306101
0504215	Building Construction	3	3	-	0504102
0504242	Surveying (I)	3	3	-	0504204
0504243	Surveying Lab	1	-	3	0504242
0504311	Structural Analysis (I)	3	3	-	0507351
0504312	Structural Analysis (II)	3	3	-	0504311
0504323	Geotechnical Engineering	3	3	-	0501213
0504328	Geotechnical Engineering Lab	1	-	3	0504323
05004343	Transportation Engineering	3	3	-	0504242
0504351	Construction Materials	3	3	-	0504323
0507351	Strength of Materials (1)	3	3	-	0504102
0507352	Strength of Materials Lab	1	-	3	0507351
0504352	Construction Materials Lab	1	-	3	0504351
0504361	Fluid Mechanics	3	3	-	0504102
0504362	Hydraulics	3	3	-	0504361
0504368	Fluid Mechanics and Hydraulics Lab	1	-	3	0504362
0504411	Reinforced Concrete (I)	3	3	-	0504311
0504412	Reinforced Concrete (II)	3	3	-	0504411
0504413	Structural Steel Design	3	3	-	0504312
0504421	Foundation Engineering (I)	3	3	-	0504323
0504443	Materials and Pavement Design	3	3	-	0504351
0504444	Highway Geometric Design	3	3	-	0504343
0504447	Highway Geometric Design Lab	1	-	3	0504444

504461	Engineering Hydrology	3	3	-	0504362
0504462	Sanitary Engineering	3	3	-	0504362
0504466	Sanitary Engineering Lab	1	-	3	0504462
0504472	Specifications, Contracts, and Quantity Surveying	3	3	-	0504411
0504547	Bridge Engineering	3	3	-	0504412
0504571	Construction Management	3	3	-	0504472
0504581	Practical Training	3	-	-	Completing 115 Cr. Hr.
0504591	Graduation Project (1)	1	-	-	Completing 115 Cr. Hr.
0504592	Graduation Project (2)	3	-	-	0504591

❖ Department Electives: (9 Credit Hours)

Course No.	Course Title	Cr. Hr.	Lec Hr.	Lab. Hr.	Prerequisite or *Corequisite
0502322	Geographical Information System (GIS)	3	3	-	0504242
0504460	Green Buildings	3	3	-	0504215
0504501	Computer Applications in Civil Engineering	3	3	-	0612114
0504512	Surveying (2)	3	3	-	0504242
0504522	Foundation Engineering (2)	3	3	-	0504421
0504525	Slope Stability	3	3	-	0504323
0504543	Traffic Engineering	3	3	-	0504444
0504548	Transportation Planning	3	3	-	0504343
0504564	Dam Engineering	3	3	-	0504413
0504565	Irrigation and Drainage Engineering	3	3	-	0504362
0504582	Special Topics in Civil Engineering	3	3	-	0504571

☞ *STUDY PLAN FOR THE B.SC DEGREE IN CIVIL ENGINEERING*

First Year				
First Term				
Course No.	**Course Title**	**Cr. Hr.**	**Prerequisite1**	**Prereq.2**
0302101	Calculus(1)	3		
0303101	General Physics (1)	3		
0306101	General Chemistry (1)	3		
0501100	Introduction to Engineering	1		
	Compulsory University	3		
	University Elective	3		
	Total	**16**		
Second Term				
Course No.	**Course Title**	**Cr. Hr.**	**Prerequisite1**	**Prereq.2**
0302102	Calculus (2)	3	0302101	
0303102	General Physics (2)	3	0303101	
0303103	General Physics Lab (1)	1	0303101	
0306103	General Chemistry Lab (1)	1	0306101	
0612114	C^{++} Programming Language	3	0612099	
0507231	Engineering Drawing	2	0612099	
0504102	Statics	3	0303101	
	Total	**16**		

Second Year				
First Term				
Course No.	**Course Title**	**Cr. Hr.**	**Prerequisite1**	**Prereq.2**
0302203	Deferential Equations(1)	3	0302102	
0501213	Engineering Geology	3	0306101	
0502200	Numerical Analysis for Engineers	3	0302203	
0303104	General Physics Lab (2)	1	0303102	
0507291	Engineering Workshops	1		
	University Elective	3		
	Compulsory University	3		
	Total	**17**		
Second Term				
Course No.	**Course Title**	**Cr. Hr.**	**Prerequisite1**	**Prereq.2**
0504204	Probability and Engineering Statistic	3	0302102	
0507212	Dynamic	3	0504102	
0504215	Building Construction	3	0504102	
0504242	Surveying (1)	3	0504204	
0507351	Strength of Materials (1)	3	0504102	
	Compulsory University	3		
	Total	**18**		

Third Year				
First Term				
Course No.	**Course Title**	**Cr. Hr.**	**Prerequisite1**	**Prereq.2**
0504323	Geotechnical Engineering	3	0501213	
0502300	Communication Skills	1	0202101	
0504351	Construction Materials	3	0504323	
0504311	Structural Analysis (I)	3	0507351	
0504361	Fluid Mechanics	3	0504102	-
0504243	Surveying lab	1	0504242	
0507352	Strength of Materials Lab	1	0507351	
	University Elective	3		
	Total	**18**		
Second Term				
Course No.	**Course Title**	**Cr. Hr.**	**Prerequisite1**	**Prereq.2**
0504312	Structural Analysis (II)	3	0504311	
0504328	Geotechnical Engineering Lab	1	0504323	
0504362	Hydraulics	3	0504361	
0504343	Transportation Engineering	3	0504242	
0504352	Construction Materials Lab	1	0504351	
	University Elective	3		
	Compulsory University	3		
	Total	**17**		

Fourth Year				
First Term				
Course No.	**Course Title**	**Cr. Hr.**	**Prerequisite1**	**Prereq.2**
0504421	Foundation Engineering (I)	3	0504323	
0504411	Reinforced Concrete (I)	3	0504311	
0504443	Materials and Pavement Design	3	0504444	
0504368	Fluid Mechanics and Hydraulics Lab	1	0504362	
504461	Engineering Hydrology	3	0504362	
0501454	Engineering Economy	3	0302102	
	Total	**16**		
Second Term				
Course No.	**Course Title**	**Cr. Hr.**	**Prerequisite1**	**Prereq.2**
0504462	Sanitary Engineering	3	0504362	
0504412	Reinforced Concrete (II)	3	0504411	
0504444	Highway Geometric Design	3	0504343	
0504472	Contracts, Specifications and Quantities Surveying	3	0504411	
0504413	Structural Steel Design	3	0504312	
	University Elective	3		
	Total	**18**		

Summer Term				
Course No.	**Course Title**	**Cr. Hr.**	**Prerequisite1**	**Prereq.2**
0504581	Practical Training	3	Completing 115 Cr. Hr.	
	Total	**3**		

Fifth Year				
First Term				
Course No.	**Course Title**	**Cr. Hr.**	**Prerequisite1**	**Prereq.2**
0504591	Graduation Project (I)	1	115 Cr. Hr	
0504547	Bridge Engineering	3	0504412	
0504571	Construction Management	3	0504472	
0504466	Sanitary Engineering Lab	1	0504462	
0504447	Highway Geometric Design Lab	1	0504444	
	Department Elective	3		
	Total	**12**		
Second Term				
Course No.	**Course Title**	**Cr. Hr.**	**Prerequisite1**	**Prereq.2**
0504592	Graduation Project (II)	3	0504591	
	Department Elective	3		
	University Elective	3		
	Total	**9**		

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☞ *COURSES DESCRIPTION*

0504102	**Statics**	**3 Credit Hours**
Introduction, basic definitions of force system, components, resultants, couples, equilibrium, structures (trusses, frames, machines), distributed load, center of area and center of gravity, areas and compound volumes, shear force and bending moment in beams, moment of inertia.		
Per-/ Co-Requisites:	0303101	
0504204	**Probability and Engineering Statistic**	**3 Credit Hours**
Descriptive Statistics. Probability, Random Variables, Discrete and Continuous distributions, Sampling Distributions and Confidence Intervals, Simple Linear regression, Correlation Analysis, Testing of hypothesis.		
Per-/ Co-Requisites:	0302102	
0504215	**Building Construction**	**3 Credit Hours**
Introduction to the development of building philosophy, Types of buildings and structural systems, Structural elements and transfer of load among the building components, types of foundations , stair types and Geometric design of stairs, Form work, Flooring, and damp proofing, Brick works , Plastering , Provision of joints in structures, Civil engineering drawing, Sections and details of different components and works.		
Per-/ Co-Requisites:	0504102	
0504242	**Surveying (1)**	**3 Credit Hours**
Introduction to surveying, types of surveying, principles and basic definition of surveying, types of measurements, chain surveying, scale, errors in measurements, linear measurements, bearings, leveling, profiles and cross-sections, contour lines, theodolite, area and volume calculation.		
Per-/ Co-Requisites:	0504204	
0504243	**Surveying Lab (1)**	**1 Credit Hours**
Application on linear measurements using tapes and electronic devices, vertical and horizontal angle measurements, setting out details, elevation measurements, profile and cross-section plotting, contour mapping, topographical mapping, application on planometer, compass and slopes measurement devices, volume and area measurement.		
Per-/ Co-Requisites:	0504242	
0504311	**Structural Analysis (1)**	**3 Credit Hours**
Analysis of statically determinate structures, stability and determinacy of structures, types of loads, and internal forces in statistically determinate structures: axial forces, flexural forces, shear forces in beams, frames, arches, plane and space trusses. Shear and moment diagrams, Influence lines for beams and trusses. Deflections, moment area method, conjugate beams, energy method, and virtual works.		
Per-/ Co-Requisites:	0507351	
0504312	**Structural Analysis (2)**	**3 Credit Hours**
Classical theories, deflected shapes, principle of symmetrical and unsymmetrical structures, statistically indeterminate method of consistent displacement and least work methods, slope deflection method with or without side sway, moment distribution (without and with side sway).		
Per-/ Co-Requisites:	0504311	
0504323	**Geotechnical Engineering**	**3 Credit Hours**

Index properties of soils, soil classification, flow in porous media: one dimensional and two dimensional flow, soil-stresses, compaction, distribution of stresses due to surface loads, consolidation theory and effect of construction period, shear strength of soils and shear strength tests.

Per-/ Co-Requisites:	05012013	
0504328	**Geotechnical Engineering Lab**	**1 Credit Hours**

Water contents, liquid and plastic limits, shrinkage limit, sieve analysis, hydrometer, compaction test, consolidation test, unconfined compression test, triaxial test, direct shear test.

Per-/ Co-Requisites:	0504323	
0504343	**Transportation Engineering**	**3 Credit Hours**

Transportation systems, urban public transportation, transit system classification, vehicle characteristics and characteristics of public transportation, modes of public transportation vehicles, energy consumption, efficiency, transportation system analysis (capacity, productivity, efficiency, utilization). Design and operation of urban transportation systems. Intercity transportation: (land, air and water modes), introduction to urban goods movement, introduction about airport design.

Per-/ Co-Requisites:	0504242	
0504351	**Construction Materials**	**3 Credit Hours**

Cement manufacturing, types and properties of cement, aggregates properties, fresh concrete properties, (Mixing, transporting, placing and compacting of concrete,) admixtures, curing of concrete and strength development, hot and cold weather- concreting, hardened concrete properties, durability of concrete and concrete mix design, fiber reinforced concrete.

Per-/ Co-Requisites:	0504323	
0504352	**Construction Materials Lab**	**1 Credit Hours**

Cement tests: Specific Gravity, Normal Consistency & setting time, surface area (fineness of cement), soundness, Mechanical Properties of Mortar. Aggregate test: Los Angeles abrasions test, impact resisting test, Sieve Analysis, Unit Weight of Aggregate, Specific Gravity of Aggregate. Fresh concrete tests: slump test, compaction factor, void ratio, cubic and cylindrical specimens. Hardened concrete tests: flexure, compression and tensile strength, Schmidt hammer test, ultrasonic test.

Per-/ Co-Requisites:	0504351	
504361	**Fluid mechanics**	**3 Credit Hours**

Introduction, fluid definition and its various properties, Principles of fluid static, Flow concepts and conservation of mass principle, Pressure variation, Bernoulli's and continuity equations, Momentum principle, Energy principle, Pipe flow, major head losses, minor head losses.

Per-/ Co-Requisites:	0504102	
0504362	**Hydraulics**	**3 Credit Hours**

Open Channel Flow, Type of Flows, Classification of Open Channel Flows, Specific Energy, hydraulic jump, Types of Water Surface Profiles and calculations, Design of open channels, hydraulic pumps, performance, selection and similarity.

Per-/ Co- Requisites:	0504361	
0504368	**Fluid Mechanics and Hydraulics Lab**	**1 Credit Hours**

Center of flow, floating bodies, jet impact, head loss in pipes during laminar and turbulent flow, logarithmic velocity curve in pipe system, flow measuring devices, openings gates and orifice, Venturi meter, flow over sharp crested wires and over broad crested weirs, uniform flow in channel, wave speed, specific energy and critical depth, hydraulic jump resisting forces for cylindrical bodies, lifting and drag forces for irregular shape bodies, Venturi meters, partial channel, hydraulic machines, pump performance, fans, radial flow fans, centrifugal pumps, pumps in series and pumps in parallel.

Per-/ Co- Requisites:	0504362	
0504461	**Engineering Hydrology**	**3 Credit Hours**
Hydrological cycle, precipitation, evaporation, seepage, infiltration and percolation, ground water hydrology, ground water movement and methods of usage, surface water, hydrograph analysis, flood analysis, hydrological prediction.		
Per-/ Co- Requisites:	0504362	
0504411	**Reinforced Concrete (1)**	**3 Credit Hours**
Properties of concrete and steel, cracked and uncracked sections, ultimate method design, singly and doubly reinforced sections, rectangular and T-sections, principles of ductile and brittle behavior, flexural design, shear force design, development length, structural details of all concrete members, design of one-way solid and ribbed slabs, concentric and eccentric columns, interaction diagrams.		
Per-/ Co- Requisites:	0504311	
0504412	**Reinforced Concrete (2)**	**3 Credit Hours**
Combined footing, eccentric footing, slender columns, continuous beams and frames, cases of loading, redistribution of moments, cracks control, torsion design, structural distribution, design for two-way slabs, direct method design, stairs design, design of single and strip footing.		
Per-/ Co- Requisites:	0504411	
0504413	**Structural Steel Design**	**3 Credit Hours**
Properties of steel structures, allowable stresses and factor of safety, members under constant and variable tension, elastic and inelastic buckling of columns, linear and non-linear behavior of columns, local buckling, linear and non-linear behavior of beams under flexural effect, lateral buckling, deflection and shear requirements, biaxial bending, base plates, connections by bolts and welds.		
Per-/ Co- Requisites:	0504312	
0504421	**Foundation Engineering (1)**	**3 Credit Hours**
Site investigation, bearing capacity of soils and rocks, stress distribution beneath foundations, settlement of soils and shallow foundations. Design of footings: spread footings, rectangular combined footings and braced or cantilever footings. Deep foundations, bearing capacity and settlement, lateral earth pressure, earth-retaining structures, and foundation on expansive soils, special topics.		
Per-/ Co- Requisites:	0504323	
0504443	**Materials and Pavement Design**	**3 Credit Hours**
Types of pavements, materials used in flexible and rigid pavements, preparation of the sub-grade, area calculation, preparation of volume sheet and mass-hole diagram, strength properties of pavement structural layers, axle loads, design methods of highway flexible and rigid pavement, marshal method for hot mix design.		
Per-/ Co-Requisites:	0504351	
0504444	**Highway Geometric Design**	**3 Credit Hours**
Importance of highways. characteristics of highways, types and classification of highways, investigation of highway route, factors affecting the geometric design of highways, stopping and passing sight distances elements and design horizontal alignment, lateral clearance on horizontal curves, super elevation, transition curves, rotation diagrams, coordination of horizontal alignment, characteristics, types and design of vertical alignment, sight distance on vertical curves, highest and lowest points on vertical curves, coordination of vertical alignment.		
Per-/ Co-Requisites:	0504343	
0504447	**Highway Geometric Design Lab**	**1 Credit Hours**
California Bearing Ratio (CBR) tests. Tests of asphalt materials: say bolt viscosity test, ductility of bituminous materials, penetration of bituminous materials, flash and softening points, specific gravity of semi-solid bituminous materials, and method of hot mix design (Marshal test), extraction test, and skid resistance.		

Per-/ Co-Requisites:	0504444	
0504462	**Sanitary Engineering**	**3 Credit Hours**
Pipe Networks, Design of Water Distribution System, Population Forecast, Water Demand, Water and Wastewater Quantity and Quality, Design of Sanitary Sewers, design of a water distribution System and Sewer System for a city in Jordan.		
Per-/ Co-Requisites:	0504362	
0504466	**Sanitary Engineering Lab**	**1 Credit Hours**
Volumetric and spectrophotometric analytical methods are used to determine quality parameters of raw water and wastewater. Parameters tested include chloride, ammonia, coliform bacteria, alkalinity, hardness, salinity and solids, BOD and COD among others.		
Per-/ Co-Requisites:	0504462	
0504472	**Contracts, Specifications and Quantities Surveying**	**3 Credit Hours**
General tender, types of bids, contracts, tender documents, general conditions of Jordan specifications of buildings, calculation of quantities and cost estimation, introduction to value engineering.		
Per-/ Co-Requisites:	0504411	
0504571	**Construction Management**	**3 Credit Hours**
Scientific methods of project management. Conventional linear programming. Network analysis using: arrow, circles and PERT networking, interrelated networks in multi relations, time duration activity, and project control, network up grading, resource leveling and distribution methods.		
Per-/ Co-Requisites:	0504472	
0504547	**Bridge Engineering**	**3 Credit Hours**
Types of bridges, design specifications, loads, distribution of loads, distribution of wheel loads on concrete slabs, construction details, design of reinforced concrete load bridge, design of deck-girder bridge, design of a composite bridge, influence line of continuous bridge, design of continuous bridges.		
Per-/ Co-Requisites:	0504412	
0504581	**Practical Training**	**3 Credit Hours**
Practical (8 weeks) training in a Civil Engineering Project or any other place approved by the department, and according to the regulations drafted by the college of Engineering Training Committee		
Per-/ Co-Requisites:	Completing 115 Cr. Hr.	
0504591	**Graduation Project (1)**	**1 Credit Hours**
Preparation and starting of engineering project in one of the civil engineering fields (structures, water and environmental engineering, highway engineering, materials).		
Per-/ Co-Requisites:	Completing 115 Cr. Hr.	
0504592	**Graduation Project (2)**	**3 Credit Hours**
Continuation of project (1) (writing a technical report and the project drawings and details).		
Per-/ Co-Requisites:	0504591	
0504460	**Green Buildings**	**3 Credit Hours**
Methods and materials used for buildings that conserve energy, water, and human resources.		
Per-/ Co-Requisites:	0504215	
0504501	**Computer Applications in Civil Engineering**	**3 Credit Hours**
Using software and applications covering the field of civil engineering, related to the (roads and transportation, water and environment, construction, mathematics and statistics).		
Per-/ Co-Requisites:	0612114	
0504512	**Surveying (2)**	**3 Credit Hours**

General principles of aerial photography, types of aerial images, principles of measurement by using images, image orientation and modification. Production of regular maps, stereographic and digital maps of aerial photographs, aerial triangulation, applications of aerospace in civil engineering work curves, types and calculations, calculation of road sections and profiles and topographic maps and control lines.		
Per-/ Co-Requisites:	0504242	
0504522	**Foundation Engineering (2)**	**3 Credit Hours**
Analysis and design related to shallow and deep foundation. Topics include site investigations, retaining walls, soil reinforcement, bearing capacity, foundation settlement, seismic design, pile foundations, factors to consider in foundation design and computer applications in foundation engineering. Introduction to new evolving techniques of geotechnical analysis and design. Term project.		
Per-/ Co-Requisites:	0504421	
0504525	**Slope Stability**	**3 Credit Hours**
Analyzing the static stability of slopes of earth and rock, analyzing the static stability of slopes of earth and rock-fill dams, slopes of other types of embankments, excavated slopes, and natural slopes in soil and rock.		
Per-/ Co-Requisites:	0504323	
0504543	**Traffic Engineering**	**3 Credit Hours**
Characteristics of road system elements ,spot speed, traffic volume, travels time and delay, parking, accidents. Fundamental principles of traffic flow, speed-volume-density relationships, intersection control, traffic signal design, capacity and level of service calculations for highway sections and intersections, traffic control devices.		
Per-/ Co-Requisites:	0504444	
0504548	**Transportation Planning**	**3 Credit Hours**
Types of planning, land use and transportation model. Transportation studies, data collection, and surveys of current demand, highway capacity studies, land use studies, and traffic volume studies. Environmental impact of transportation. Transportation modeling: trip penetration, trip distribution, modal split traffic assignment. Evaluation of transportation planning options, traffic impact analysis.		
Per-/ Co-Requisites:	0504343	
0504564	**Dam Engineering**	**3 Credit Hours**
Environmental concepts, water quality, hydrological studies, topographical studies, choice of dam type and dam location based on natural, economic and social considerations, site investigations. Data resources, soil and rock studies, geophysics studies. Laboratory and field tests. Types of dams.		
Per-/ Co-Requisites:	0504413	
0504565	**Irrigation and Drainage Engineering**	**3 Credit Hours**
Irrigation: economizing irrigation water resources, storage design, water transportation, irrigation and drainage channels. Design of storage tanks, wells, irrigation systems, water transportation irrigation and drainage channels, channel lining and design. Irrigation structures: types and functions. Drainage systems and water disposal. Water reuse.		
Per-/ Co-Requisites:	0504362	
0504582	**Special Topics in Civil Engineering**	**3 Credit Hours**
Choose one or more advanced topics related to civil engineering branches.		
Per-/ Co-Requisites:	0504571	