Department of Civil Engineering
B.Sc. Course Description

0901230 Engineering Geology
Prereq. (---) (3 Cr. Hrs.)
Introduction to Geology, Minerals and Rocks, Superficial Deposits, Structural Geology, Groundwater, Properties and classification of Rocks, Use of Rocks for Engineering Purposes, Site Investigation, Engineering Geology in Practice.

0901231 Geotechnical Engineering
Prereq. (0901242) (3 Cr. Hrs.)
Index properties of soils, soil classification, plow 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.

0901232 Geotechnical Engineering Lab.
Prereq. /Coreq. (0901231) (1 Cr. Hr.)
Water content determination, liquid and plastic limits, shrinkage limit, grain-size distribution (Sieve analysis), hydrometer analysis, compaction, in-situ field density, constant and falling head permeability tests, consolidation test, unconfined compression test, triaxial test, direct shear box.

0901241 Statics
Prereq. (0301101) (3 Cr. Hrs.)
Force systems (2D and 3D), equilibrium of particles and rigid bodies (2D and 3D), structures (trusses, frames and machines), distributed forces (centroids and centers of mass), beams (shearing force and bending moment diagrams), friction, moments of inertia and virtual work.

901242 Strength of Materials
Prereq. (0901241) (3 Cr. Hrs.)
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-

0901243  Structural Mechanics  (3 Cr. Hrs.)
Prereq. (0301101)
Scalars and vectors, force components, moments, resultants. Rigid and deformable bodies, equilibrium, types of supports, free body diagram, structures, trusses, beams, method of joints and method of sections, shear and bending moment diagrams, distributed forces, centroids, second moment of area, composite areas, stresses and strains. Axial deformations, flexural stresses, shear stresses.

0901253  Introduction to Structural Design  (3 Cr. Hrs.)
Prereq. (0901243)

0901281  Surveying  (3 Cr. Hrs.)
Prereq. (0301101)
Principles and basic definitions, units of measurements, plotting scale, linear measurements, leveling, bearings, the Theodolite and its applications, contour lines, traversing, locating points by intersection and resection, areas and volumes.

0901282  Surveying Lab.  (1 Cr. Hr.)
Prereq./Coreq. (0901281)
Distance measurement and adjustment, leveling exercises, Theodolite exercises, contouring exercises, topographic surveys, determination of areas and volumes, traversing exercises.

0901283  Surveying for Architects  (2 Cr. Hrs.)
Prereq. (0301101)
Principles and basic definitions, units of measurements, plotting scale, linear measurements, leveling, bearings, the Theodolite and its applications, contour lines, areas and volumes.

0901301  Engineering Numerical Methods  (3 Cr. Hrs.,)
Prereq. (0301202)


901303 Computer Applications  
Prereq. (0901301) 


0901331 Foundations  
Prereq. (0901232) 

Site investigation, bearing capacity of soils and rocks, distribution of stresses in soils, settlement of shallow foundations, factors to consider in foundation design, deep foundations capacity and settlement, lateral earth pressure and retaining walls, foundation on expansive soils, stability of slopes.

0901341 Structures (1)  
Prereq. (0901342) 

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.

0901342 Structures (2)  
Prereq. (0901341) 

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.

0901351 Properties of Concrete (3 Cr. Hrs.)
Prereq./Coreq. (0901242)

0901352 Properties of Concrete Lab. (1 Cr. Hr.)
Prereq./Coreq. (0901351)
This laboratory includes tests for a number of construction materials, especially concrete, concrete materials, aggregates in general, hollow blocks, bricks, asbestos, tiles, in addition to concrete mixes and casting concrete.

0901361 Fluid Mechanics (3 Cr. Hrs.)
Prereq. (0301201 or concurrent)

0901362 Hydraulics (3 Cr. Hrs.)
Prereq. (0901361)

0901363 Hydraulics Lab. (1 Cr. Hr.)
Prereq./Coreq. (0901362)
Center of pressure, triangular and rectangular notches, Venturi and orifice meters, impact of a jet, head loss in pipes, critical depth, turbulent pipe flow, centrifugal pumps, axial flow pumps, hydraulic jump, Pelton wheel, radial flow fan.
0901371 Water Supply Engineering  
Prereq. (0901361)  
(3 Cr. Hrs.)  

0901401 Engineering Statistics  
Prereq. (0301102)  
(3 Cr. Hrs.)  
Descriptive statistics, discrete and continuous random variables and probability distributions, joint probability distributions, point and interval estimation, tests of hypothesis, correlation and regression, analysis of variance, time series.

0901420 Engineering Economy  
Prereq. (---)  
(3 Cr. Hrs.)  

0901421 Contracts, Specifications  
Prereq. (0901451)  
(3 Cr. Hrs.)  
Contractual procedures, types of contracts, contract documents, bills of quantities, specification drafting, quantity measurement.

0901431 Earth Retaining Structures  
Prereq. (0901331)  
(3 Cr. Hrs.)  
Review of fundamentals, lateral earth pressure, retaining walls, sheet-pile walls, cantilever sheet-pile walls, anchored sheet-pile walls, braced-excavation, reinforced earth, retaining walls with metallic strip reinforcement, retaining walls with metallic geotextile, gabions.

0901451 Reinforced Concrete (1)  
Prereq. (0901352 & 0901341)  
(3 Cr. Hrs.)
Properties of concrete and steel, working stress design, allowable stresses, cracked and uncracked sections, strength design, stress block, singly and doubly reinforced sections, rectangular, T-sections and other shapes, concepts of ductile and brittle behavior, design for bending, shear design, bond requirements, development length, one-way solid and ribbed slabs, approximate methods for two-way slabs, design of columns, axially and eccentrically loaded, short columns, interaction curves.

0901452 Reinforced Concrete (2)  
Prereq. (0901342 & 0901451)  
(3 Cr. Hrs.)
Isolated and wall footings, combined footings, eccentrically loaded footings, slender columns, moment magnification, continuous beams and frames, pattern loading, moment envelopes, moment redistribution, estimation of dead and live loads, structural layout, deflections, crack control, detailing of reinforcement.

0901453 Steel Structures  
Prereq. (0901342)  
(3 Cr. Hrs.)
Properties of structural steel, load resistant factor design (LRFD), design of rolled and built-up tension members, design of concentric compression elements, simple welding and bolting, design of beams provided with and without adequate lateral bracing, beam-column elements, design of column base plate.

0901464 Hydrology  
Prereq. (0901363, 0901401)  
(3 Cr. Hrs.)

0901471 Wastewater Engineering  
Prereq. (0901371)  
(3 Cr. Hr.)

0901472 Environmental Engineering Lab.  
Prereq./Coreq. (0901471)  
(1 Cr. Hr.)
Water and Wastewater analysis: acidity, alkalinity, chloride, hardness, Ammonia, dissolved oxygen; biochemical oxygen demand, chemical oxygen demand, coliform bacteria, solids determination, coagulation, and softening.
0901481 Highway and Traffic Engineering (3 Cr. Hrs.)
Prereq. (0901282)
Highway systems, highway evaluation, driver, pedestrian and vehicle characteristics, traffic characteristics, geometric alignment, roadside design, intersections and interchanges design, drainage and drainage structures, contracts and supervision, traffic accidents and safety, parking, pedestrian, speed, travel time and traffic volume studies, traffic signals and control devices.

0901482 Pavement Design (3 Cr. Hrs.)
Prereq. (0901481)
Pavement types, structural design: stress analysis, vehicle and traffic consideration, structural design of flexible and rigid pavements, pavement materials: bituminous materials and their uses, asphalt concrete mix design, pavement distress and maintenance, preparation and construction of pavements. Planning of maintenance works.

0901483 Highway Engineering Laboratory (1 Cr. Hr.)
Prereq./Coreq. (0901482)
Includes the following tests:
Penetration, softening point, flash point, ductility, CBR, viscosity, stripping, loss on heat, Marshall, extraction, aggregate air content, specific gravity, skid resistance, profilograph, and surface texture.

0901521 Construction Management (3 Cr. Hrs.)
Prereq. (--)
Planning, construction management concepts, Network-analysis using arrow techniques Network analysis using precedence technique, overlapping networks, project monitoring, project control, time-cost trade off, resource leveling, PERT.

0901522 Construction methods (3 Cr. Hrs.)
Prereq. (--)
Understanding and selection of heavy construction equipment, earthmoving, tunneling, compaction, construction equipment productivity, factors affecting equipment productivity, economic analysis of plant ownership.

0901523 Project Management (3 Cr. Hrs.)
Prereq. (0901521)
Project management concepts, construction strategic planning, legal aspects of the construction process, management structure, project finance and funding, budgeting,
construction material management, personnel management, manpower planning, total quality management.

**0901541 Structures (3)**
**Prereq. (0901342)**
Force method, flexibility matrix, effect of displacement of joints: environmental effects, effect of displacements at coordinates, three moment equation, displacement method, stiffness matrix, environmental effects, comparison between the two approaches, symmetry and anti-symmetry, influence lines of frames and arches of prismatic and non-prismatic members, effect of axial and shear forces.

**0901551 Reinforced Concrete (3)**
**Prereq. (0901452)**
Design of slabs using the ACI 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.

**0901553 Introduction to Earthquake Engineering**
**Prereq. (0901452)**
Introduction to earthquake engineering, origin and characteristics of earthquakes, introduction to structural dynamics, vibration characteristics of buildings, periods and mode shapes, response spectrum, earthquake-induced forces and displacements.
Introduction to inelastic behavior, force reduction and ductility requirements for concrete and steel material, seismic design and provisions of reinforced concrete frames and shear walls according to ACI code. Introduction to Jordanian seismic code and international building seismic codes such as UBC code.

**0901555 Bridge Engineering**
**Prereq. (0901452, 0901453)**
Classification of bridges, Structural components, Superstructures and Substructures, Bridge loading, Primary loads, Secondary loads, Distribution of live loads, Analysis and design of bridges according to AASHTO specifications. Prestressed and non-prestressed bridges, Steel bridges, Bearing Pads.

**0901561 Design of Hydraulic Structures**
**Prereq. (0901363)**
Design Discharge: run-off, design flood and estimation of peak flood. Seepage and uplift pressure: Bligh’s creep and Lane’s weighted creep theory. Hydraulic jump and energy

0901562 Water Resources Engineering (3 Cr. Hrs.)
Prereq. (Hydrology 0901464)
Systems analysis of surface water, groundwater, and combined water resources. Analysis and design of convertible, distributing, conservation, and flood control reservoirs. Analysis and design of water transporting, and distributing systems using channels and pipe lines. Planning and management of water resources. Water resources economics. Local and international water law. Usage of statistics and probability in water resource design and management decision making.

0901572 Environmental Engineering (3 Cr. Hrs.)
Prereq. (0901472)

0901573 Environmental Impact Assessment (EIA) (3 Cr. Hrs.)
Prereq. (0901471)
Study of environmental impacts of engineering projects on the environmental components of water, air, and soil. Social, economical, and cultural impacts will also be studied. Various impacts will be identified and predicted and mitigational measures will be suggested.

0901574 Water Reuse (3 Cr. Hrs.)
Prereq. ()
Uses of reclaimed water that include potable uses such as for irrigation, industrial uses, and recreation and the non-direct potable uses such as aquifier recharge the suitability of reclaimed water quality for each use, the impact of water reuse on human health, animal health, plants, and on the environment in general, case studies of water reuse in different countries including Jordan.
0901582 Transportation Engineering (3 Cr. Hrs.)
Prereq. (0901482)
Air transportation: Airport planning, aircraft characteristics, airport configuration, landing area, airport capacity, and terminal area planning. Rail transportation: Cross sections, horizontal and vertical alignments superelevation, trains speed, rail sections, joints and crossings. Water transportation: Harbor types, harbor components, and harbor site selection. Urban transportation planning: Demand forecast, evaluation techniques, transportation system management, and mass transit.

0901583 Photogrammetry (3 Cr. Hrs.)
Prereq. (0901282)
Introduction to photogrammetry, aerial cameras systems, photo scale, scale distortion, types of photos, stereoscopic vision, planning aerial photography missions, ground control points, image displacements, stereoplotters, photo mosaics, application of aerial surveys to highway design and maintenance.

0901584 Remote Sensing (3 Cr. Hrs.)
Prereq. (0901282)
Introduction to remote sensing technology, forms of target interactions, remote sensing systems, the requirements and sources for remote sensing applications, role and significance of remote sensing in variety of fields, selected exercises.

0901599 Project (3 Cr. Hrs.)
Prereq. (Passing 124 Cr. Hrs.)
In coordination with the department, the student or group of students will choose a theoretical or practical project that is related to the Civil Engineering major.