

❖ Compulsory Major Requirements

A0862301 Engineering Geology {3} [3-3]

Earth structure; minerals; clay minerals; type of rocks and their properties; site investigation and exploration; use of rocks as construction materials; ground water, earthquake; landslides; soil classification.

Prerequisite : A0161201 English Communication Skills

A0862302 Engineering Materials Science{3} [3-3]

Definition of engineering materials. Classification of materials and their properties. Metallic and non-metallic materials. Metals, alloys and composite materials. Conductors, insulators and semiconductors. Mechanical, Magnetic, Thermal and electrical characteristics of materials. Industrial applications of different types of materials.

Prerequisite : A0862301 Engineering Geology

A0862303 Surveying {3} [3-3]

Introduction; units and significant Figures; theory of errors in observations; distance measurement; leveling, angles, azimuths, bearings; coordinate geometry in surveying calculations; area and volume; introduction to GPS, Photogrammetry /and GIS.

Prerequisite: A0111101 Mathematics (1)

A0862304 Surveying Lab. {1} [2-1]

Pacing and taping; slope distance measurement using tapes and clinometers; horizontal distance measurement through obstacle; building layout; leveling; measurement of elevation by rise and fall method; contour map and scale; profile leveling; application of theodolite.

Co-requisite: A0862303 Surveying

A0862401 Statics {3} [3-3]

Principles of mechanics; system of units; force vectors; resultant forces; equilibrium of a particle; rigid bodies; equivalent systems of forces; centroids and centers of gravity; analysis of structures: frames, machines, and trusses; shear forces and bending moments; friction; moments of inertia; principle of virtual work.

Prerequisite A0111201 General Physics (1)

A0862402 Strength of Materials {3} [3-3]

Mechanical properties of materials; stresses and strains in members subjected to tension, compression, and shear; torsion stresses; flexural and shearing stresses in beams; combined stresses; transformation of stresses and strains; deflection of beams; buckling of columns.

Prerequisite: A0862401 Statics (to be passed)

A0862403 Dynamics {3} [3-3]

Kinematics and kinetics of particles and systems of particles with applications to central force motion, impact and relative motion, single-degree of freedom free and forced vibration, dynamics of rigid bodies, relative motion, and gyroscopic motion, computer application.

Prerequisite: A0862401 Statics

A0862501 Concrete Technology {3} [3-3]

Cement production; properties and types of cement; hydration of cement; aggregate properties and mixing water; mixing, placing, compaction and tests of fresh concrete; types and applications of admixtures and additives; strength, durability and tests of hardened concrete; concrete mix design.

Prerequisite: A0862301 Engineering Geology

A0862502 Concrete Technology Lab. {1} [2-1]

Fineness of cement test; density of cement test; normal consistency of cement pastes and initial and final setting times tests; sieve analysis of aggregate test; Los Angeles abrasion test; impact value test; bulk density of coarse aggregates; specific gravity and absorption of fine and coarse aggregates; fresh concrete slump test; Vebe test; compaction factor test; Schmidt hammer test, cube test; concrete cube destructive test.

Co-requisite: A0862501 Concrete Technology

A0863501 Structural Analysis (1) {3} [3-3]

Introduction to structural analysis; loads: static, environmental and dynamic loading; classification of structural elements; stability and determinacy of structures: determinate trusses, cables, beams and frames; influence lines of beams and trusses; deflections in elementary structures.

Prerequisite: A0862402 Strength of Materials

A0863502 Structural Analysis (2) {3} [3-3]

Analysis of statically indeterminate structures: Force Method, Slope-Deflection Method, Moment Distribution Method; introduction to matrix structural analysis.

Prerequisite: A0863501 Structural Analysis (1)

A0863601 Hydraulics {3} [3-3]

Fluids in static state and motion; flow in pipes; head losses; cavitation; design of pipe networks; pump characteristics and selection; open Channel flow; uniform flow; Chezy and Manning equations; varied flow; specific energy; critical depth; hydraulic jump; engineering applications.

Prerequisite: A0833603 Fluid Mechanics

A0863602 Fluid Mechanics and Engineering Hydraulics Lab. {1} [2-1]

Center of pressure; Flow above opening and control gates; Pressure in pipes; Flow under control gate; Hydraulic jump; Type of flow; Venture meter.

Prerequisite: A0863601 Hydraulics

A0863701 Traffic and Transportation Engineering {3} [3-3]

Introduction to transport and transportation engineering; types passenger and freight transportation; transportation systems and elements; design criteria for transportation systems; traffic flow theory and queuing theory; introduction to capacity analysis and quality of service; logistic in transportation; transportation environmental impact; introduction to transportation planning.

Prerequisite: A0862303 Surveying , A0832102 Engineering Statistics (to be passed)

A0863702 Traffic and Transportation Engineering Lab. {1} [2-1]

Conducting traffic studies in the field, including speed and travel delay studies, volume counting; road side interview and travel demand studies. Parking studies.

Co-requisite: A0863701 Traffic and Transportation Engineering

A0863703 Geometric and Highway Design {3} [3-3]

Classification of highway and railway systems; Geometric design concepts for highways and railways; design control and criteria; sight distance requirements; design of horizontal and vertical alignments; cross-section elements; super-elevation attainment; side slopes and drainage requirements; earthwork computations; highway intersection types; design of at grade-intersections and grade separation intersection; route alternative evaluation; practical applications; computer applications in geometric design.

Prerequisite: A0863701 Traffic and Transportation Engineering

A0863801 Geotechnical Engineering {3} [3-3]

Introduction to soil mechanics; formation and structure of soil; Atterberg's limits; classification of soil; compaction; permeability; seepage flow; stress distribution; consolidation; shear strength; lateral earth pressure; stability of slopes.

Prerequisite: A0862402 Strength of Materials (to be passed)

A0863802 Geotechnical Engineering Lab. {1} [2-1]

Specific gravity; moisture content; liquid; plastic and shrinkage limits; consolidation test; sieve analysis; field density; compaction test; permeability; Shear strength of soil: direct shear, unconfined and triaxial tests; consolidation test.

Co-requisite: A0863801 Geotechnical Engineering

A0864301 Civil Engineering Drawing{2} [2-2]

Introduction; primary structural plans: topographic and site plans; reinforced concrete building plans; detailing of: footing columns, slabs, beams section, stairs; detailing of steel structures; AutoCAD. Corridor selection; cross-section elements; curves for horizontal and vertical alignments; superelevation arraignment; drainage facilities (pipes and culverts); traffic signs and marking; intersections and interchanges; reading and executing highway plans.

Prerequisite: A0864501 Reinforced Concrete Design (1) , A0831201 Engineering Drawing (to be passed)

A0864501 Reinforced Concrete Design (1) {3} [3-3]

Materials properties; load calculations according to ACI; flexural analysis and design of beams; design for shear and diagonal tension; bond, anchorage and development length; design of one way slabs; short columns under compression combined with moment (interaction diagrams); design of foundation (spread footing and wall footing).

Prerequisite: A0862501 Concrete Technology , A0863501 Structural Analysis (1)

A0864502 Design of Steel Structures {3} [3-3]

Introduction: specifications, loads and methods of design; analysis and design of tension and compression members; design of beams for flexure, shear, and torsion; analysis and design of beam-columns; bolted and welded connections.

Prerequisite: A0863502 Structural Analysis (2)

A0864601 Engineering Hydrology {3} [3-3]

Hydrological cycle; Surface runoff; Rainfall-runoff analysis; Hydrograph analysis; Unit hydrograph; Synthetic unit hydrograph development; Hydraulic channel routing; Hydrologic reservoir routing; Basics of groundwater hydrology; Probability and statistics concepts in hydrologic design; Rational method design; Engineering applications.

Prerequisite: A0863601 Hydraulics

A0864602 Water, Environmental and Sanitary Engineering {3} [3-3]

Definitions of the environmental engineering concepts; Pollution sources and types; Pollution prevention; Air pollution, sources and causes; Principles of water chemistry and Microbiology; Design of water distribution systems; Drinking water treatment; Wastewater characteristics and treatment. Contemporary issues

Prerequisite: A0863601 Hydraulics

A0864603 Environmental and Sanitary Engineering Lab. {1} [2-1]

Analysis of drinking water and wastewater to determine: acidity, turbidity, alkalinity, hardness, ammonia, and chlorine content; Coagulation; Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD); Dissolved and suspended solid materials; Ion exchange; Carbon adsorption.

Co-requisite: A0864602 Water, Environmental and Sanitary Engineering

A0864701 Pavement Design {3} [3-3]

Types of pavements; stress analysis in flexible and rigid pavements; traffic load forecasting and analysis; design of flexible and rigid pavement for highways; asphalt mix design; introduction pavement distresses type and causes and evaluation economic analysis and optimization of pavement alternatives; computer applications in pavement design.

Prerequisite: A0863701 Traffic and Transportation Engineering

A0864702 Pavement Design Lab.{1} [2-1]

The tests of asphaltic materials: Saybolt viscosity, Penetration, Ductility, Flash and Fire Point, Softening Point; Loss on Heating; Asphalt Mix Design (Marshall Method); Maximum Specific Gravity; Extraction Test; Skid Resistant and Surface Texture; British Pendulum; California Bearing Ratio test.

Co-requisite: A0864701 Pavement Design

A0864801 Foundation Engineering {3} [3-3]

Site investigation; foundation classifications; bearing capacity; foundation settlement; factors affecting foundation design; spread footing; combined footing; wall footing; mat foundations; lateral earth pressure and retaining walls; settlement.

Prerequisite: A0863801 Geotechnical Engineering , A0864501 Reinforced Concrete Design (1)

A0864901 Specifications, Contracts, and Quantity Surveying {3} [3-3]

Introduction to the Jordanian legal systems and law applicable to the construction industry; Introduction to value engineering and quality control; An introduction to the legal aspects of construction projects, emphasis on legal problems directly applied to the practice of project management; Contracts and specifications documents, codes and zoning laws and labor laws; Quantity survey procedure, methods and analysis; quantity surveys and pricing; bidding and negotiating.

Prerequisite: A0864501 Reinforced Concrete Design (1)

A0864902 Field Training {3} [6-3] [Eight Weeks]

Students are required to conduct field training after passing 110 credit hours for eight weeks in a pre approved and recognized institute, department, company or firm in one of the various areas in civil engineering.

Prerequisite: A0812201 Communications Skills & professional Ethics , Pass 115 Cr.H.

A0865501 Reinforced Concrete Design (2) {3} [3-3]

Serviceability of beams and one-way slabs; continuous beams: loading patterns, moment envelopes; design of biaxial Loaded columns; slender columns; design for torsion, torsion plus shear; design of two-way slabs; design of combined footings.

Prerequisite: A0864501 Reinforced Concrete Design (1) (to be passed) , A0863502 Structural Analysis (2)

A0865901 Construction Project Management {3} [3-3]

Concepts and definition; Planning; Project scheduling techniques (Ghantt Chart, CPM, PERT); Developing the schedule; Cost management; Risk management; Project organization (site and resources).

Prerequisite: A0864901 Specifications, Contracts, and Quantity Surveying

A0865902 Graduation Project (1) {1} [1-1]

Students work in groups to conduct a graduation project in two phases, graduation project I is the first phase which includes developing proposal, literature review, problem identification and data collection.

Prerequisite: A0864902 Field Training (to be passed)

A0865903 Graduation Project (2) {2}[2-2]

This is a continuation of graduation project I, where students start their analysis and design to conclude with.

Prerequisite: A0865902 Graduation Project (1)

❖ **Elective Major Requirements**

A0865502 Bridge Engineering {3} [3-3]

Identification of material properties in reinforced concrete; load calculations by AASHTO; analysis of bridges in the form of one direction; analysis of bridges with gravity on reinforced concrete; design of reinforced concrete bridges and prestressed.

Prerequisite: A0864501 Reinforced Concrete Design (1)

A0865503 Earthquake Engineering {3} [3-3]

Concept of seismic design; analysis of earthquake effects; choice and design of earthquake resistance systems; the behavior of reinforced concrete under cyclic loading; analysis according to static force procedure, response spectrum; analysis, design of reinforced concrete sections to resist earthquake loads.

Prerequisite: A0865501 Reinforced Concrete Design (2)

A0865504 Prestressed Concrete {3} [3-3]

Introduction; pre-stressed concrete concepts and materials; detailed estimation of losses, design for flexure; design for shear and torsion; slab and beam design; Composite construction and design; shear-friction theory; computer applications.

Prerequisite: A0865501 Reinforced Concrete Design (2)

A0865601 Water Resources {3} [3-3]

Hydrologic and hydraulic design concepts for water resources systems; Functions and design of hydraulic structures; Storm water systems design; Groundwater occurrences and Darcy's law; Equations of groundwater flow; Well hydraulics; Flow in confined and unconfined aquifers; Engineering economy concepts in planning and management of water resources systems; Computer applications in water resources; Contemporary issues.

Prerequisite: A0864601 Engineering Hydrology

A0865602 Irrigation, Drainage, and Dam Engineering {3} [3-3]

Sources of irrigation water; Long term storage; Design of dams and reservoirs; Design of irrigation structures and drainage canals; Design of culverts and measurement structures; Contemporary issues

Prerequisite: A0863601 Hydraulics

A0865603 Treatment of Liquid and Solid Wastes {3} [3-3]

Wastewater conveyance systems; Design of sewers; Wastewater management; Advanced wastewater treatment and reuse; Sources, types, and composition of solid wastes; sanitary landfills; landfill techniques for domestic, industrial, and hazardous wastes; landfill rehabilitation. Contemporary issues.

Prerequisite: A0864602 Water, Environmental and Sanitary Engineering

A0865701 Pavement Maintenance and Rehabilitation {3} [3-3]

Introduction to pavement maintenance management process; pavement networks definitions and classifications; pavement distress evaluation and rating procedure; Pavement testing types (destructive and nondestructive tests); pavement condition forecasting; overview of maintenance and rehabilitation techniques; network level management; project level management; computer applications in pavement maintenance and rehabilitation.

Prerequisite: A0864701 Pavement Design

A0865902 Computer Applications in Civil Engineering [3-3] {3}

Practical applications using civil engineering computer software packages in structure, transportation, soil, or management. Using available software in the analysis and design of projects.

Prerequisite: A0863703 Geometric and Highway Design, A0865501 Reinforced Concrete Design (2)

A0865903 Selected Topics in Civil Engineering {3} [3-3]

Prerequisite: Department Approval.