Course Descriptions

(0106101) Mathematics 1 **3 Credit Hr**	**Prerequisite:-**
Limits and continuity and their applications: chain rule, Implicit differentiation, related rates, increase decrease, concavity. Extrema. Newton's method, Roll's theorem, Mean-Value Theorem, definite and indefinite integrations, fundamental theorem of calculus, Area and volume, inverse functions, Exponential and logarithmic functions with their derivatives , conic sections.	
(0106102) Mathematics 2 **3 Credit Hr**	**Prerequisite: 0106101**
Inverse trigonometric and hyperbolic functions. Techniques of integration, by parts, trigonometric integrals, trigonometric substitutions, partial fractions, quadratic expressions, general substitutions. Improper integrals. Infinite series, convergence and divergence, convergence tests, Maclaurin and Taylor series. Polar coordinates: definition, arc length , area, conic sections.	
(0106103) Physics 1 **3 Credit Hr**	**Co-requisite: 0106101**
Motion in One Dimension, Vectors, Motion in Two Dimensions, The Laws of Motion, Circular Motion and Other Applications of Newton's Laws, Work and Kinetic Energy, Potential Energy and Conservation of Energy, Linear Momentum and Collisions, Rotation of a Rigid Object About a Fixed Axis, Rolling Motion and Angular Momentum.	
(0106104) Physics 2 **3 Credit Hr**	**Prerequisite: 0106103**
Charge and matter, Electric field. Gauss law. Electric potential. Capacitors and dielectrics. Electromotive force and electric circuits. Magnetic field. Ampere's law. Faraday's law of induction. Self induction. Maxwell's equations	
(0106105) Physics Lab 1 **1 Credit Hr**	**Co-requisite: 0106103**
Collection and Analysis of Data, Measurements and Uncertainties, Vectors: Force Table, Kinematics of Rectilinear Motion, Force and Motion and Newton's laws, Collision in Two Dimensions, Rotational Motion, Simple Harmonic Motion: Simple Pendulum, The Behavior of Gases with Changes in Temperature and Pressure, Measuring the coefficient of viscosity of liquid, Specific Heat Capacity of Metals.	
(010601106) Physics Lab 2 **1 Credit Hr**	**Prerequisite: 0106104** **Co-requisite: 0106105**
Electric Field Mapping, Specific Charge of Copper Ions, Ohm's Law, Power Transfer, Potentiometer, Capacitors: RC Time Constant, Kirchhoff's Laws, Magnetic Field of a Current, Electromagnetic Induction.	
(0901107) Chemistry for Engineers **3 Credit Hr**	**Prerequisite:-**
Periodicity table, electronic composition and electronic distribution. The connectivity and periodic properties for the element. Chemical calculations, Oxidation and reduction system. Chemical equilibrium, Thermo-chemistry and Electrochemistry.	
(0901108) Engineering Drawing **2 Credit Hr**	**Prerequisite:-**
Instruments of Drawing, Graphic geometry (Lines, Letters, Numbers, Tangency Construction), Intersections, Types of Projection, Dimensioning, Plane Sectioning. Steel Structure Drawing, Reinforced Concrete Beams Drawing, Highway Projection (Curves,	

Slopes, Earth Works and their projection), Bridge Drawing (Retaining Walls, Abutments, and Piers), Projection of Water Structure at Water-way Intersection	
(0901109) Chemistry for Engineers Lab **1 Credit Hr**	**Co-requisite: 0901107**
Physical properties, specifying the element and molecule form the molecule weight. Calculating water crystallization, calculating equilibrium heat and formation heat. Solution titration, Chemical reaction speed, chemical cell voltage.	
(0901203) Engineering Workshop 1 **1 Credit Hr**	**Prerequisite:-**
Includes theoretical and practical topic covering : four workshops turning , carpentry , electricity and blacksmithing; manual work of art, the settlement and the formation, gathering wood together , all kinds of welding, the mechanism of welding machine, an arc welding electroplating, welding wire, specifications and types of electrical circuits , house electrical wiring , electric current and resistance estimating, use of production machines for metals , precision instrument , types of turnings, the development in turnings, hand tools : Saw , Drill, Lathe, stone grinding	
(0902201) Statics **3 Credit Hr**	**Prerequisite: 0106103**
Introduction to static forces and Newton's laws, SI units, Vectors and operations on vectors (summation, dot product, cross product), System of forces, resultant, definition of moment, couples, equilibrium, Distributed loads, Types of supports, Reactions (beams, frames, and trusses), center of area, center of mass, Internal forces for trusses by joints and sections, Moment of inertia for different shapes.	
(090201303) Engineering Profession **3 Credit Hr**	**Prerequisite-**
This module provides an introduction to the professional life of an engineer. It will introduce such topics as sustainability, project management and design, ethics, professional attitudes, lifelong learning, technical writing, work experience report (required for membership of the Institute of Engineers, Jordan), structure of engineering organizations, teams and teamwork and other areas associate with engineering practice.	
(090201224) Strength of Materials **3 Credit Hr**	**Prerequisite: (0902201)**
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 stress and strain. Shear stress and strain. Torsion stresses, strains, and deformations. Compound stresses and strains. . maximum and minimum stresses and strains and Mohr circle. Buckling of compression members (Euler differential equation). Deflection of beams by double integration method.	
(0902234) Strength of Materials (Lab) **3 Credit Hr**	**Co-requisite: (090201224)**
Analysis of engineering components to determine stresses, strains, and deformations using finite element method and experimental techniques.	
(090201251) Engineering Geology **2 Credit Hr**	**Prerequisite-** **Co-requisite: 0901107**
Identification of Rock and minerals types, soil properties, weathering and soils Basic principles of physical and structural geology with emphasis related to civil engineering, active tectonics and earthquakes hazards, Ground water, slope stability and landslides	
(0902252) Fluid Mechanics	**Prerequisite: 0902201**

3 Credit Hr	-
Introduction, fluid properties, basic units, fluid statics, pressure and its measurements, forces on plane and curved submerged surfaces, buoyancy & floatation, fluids in motion, flow kinematics and visualization, basic control volume approach, differential and integral continuity equation, 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 similation, surface resistance and introduction to boundary layer theory, flow in conduits, laminar and turbulent flows, frictional and minor losses, piping systems.	
(0902301) Numerical Methods for Engineers **3 Credit Hr**	**Prerequisite: 0106102** -
Introduction to numerical errors and their sources, approximation, numerical methods of solving linear equations, methods of solving nonlinear equations, curve fitting, numerical integration and differentiation, practical examples from different areas of engineering.	
(090201321) Structural Analysis 1 **3 Credit Hr**	**Prerequisite: 090201224**
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	
(090201322) Structural Analysis 2 **3 Credit Hr**	**Prerequisite: 090201321**
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 it's applications to solving indeterminate beams and frames.	
(090201324) Design of Reinforced Concrete I **3 Credit Hr**	**Co-requisite: 090201322**
Properties of concrete and steel materials, types of loads and loads combinations, concept of concrete design. Serviceability stress method, cracked and uncracked sections. Ultimate limit 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, derivation of interaction diagram.	
(0902321) Transportation Engineering **3 Credit Hr**	**Prerequisite:-** **Co-requisite: 090301211**
Transportation system, modes and component of each mode; transportation system issues and challenges; Operation and vehicular characteristics for all modes of transportation; Transportation issues and challenges; Highway functional classification; Transportation Systems Management (TSM); Rail transportation, Air transportation and Water transportation; Urban transportation system planning; Travel-demand forecasting.	
(0902322) Road and Traffic Engineering **3 Credit Hr**	**Prerequisite: 0902321** -
Highway types; Characteristics of road, pedestrian, vehicles and drivers ; Traffic flow elements ; traffic volume, speed and delay studies; traffic data collection; Travel time studies; Queuing models; Types of at-grade intersections, Design principles for at-grade	

intersections; Highway water drainage system; Introduction to traffic control; Applications using software.	
(0902341) Geotechnical Engineering **3 Credit Hr**	**Prerequisite: 090201224**
Composition and structure of soils, Phase 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, consolidation theory and consolidation settlement analysis, secondary compression, shear strength of soils (introductory).	
(0902343) Geotechnical Engineering/ lab **1 Credit Hr**	**Prerequisite:-** **Co-requisite: 0902341**
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. Students present the report of one experiment using data show.	
(0902362) Contracts, Specifications and Quantity Surveying **3 Credit Hr**	**Prerequisite: 090201324**
Legal aspects of engineering works, general and special conditions, settlement of disputes, specifications of construction works, quantity surveying for civil engineering works. The course includes term project, in which students are asked to prepare contract documents for a project that he or she chooses.	
(090201421) Reinforced Concrete Design 2 **3 Credit Hr**	**Prerequisite: 090201324**
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 and retaining walls. Calculation and check of deflection, crack width, and vibration. Analysis and design for torsion.	
(0902415) Steel Structure Design **3 Credit Hr**	**Prerequisite:-** **Co-requisite: 090201322**
Introduction to the behavior and design of steel structure, properties and codes of steel structures, loads and design philosophies (LRFD), design of tension members, design of compression members (columns). Analysis and design of beams under flexural effect, lateral torsional buckling, deflection, design for shear, design of connections by bolts and welding.	
(090201432) Highway and Runway Pavement design **3 Credit Hr**	**Prerequisite:0902322 & 0902341**
Types of pavement (flexible and rigid), Stress, strain, and deflection analysis in flexible and rigid pavement. Traffic loading and volume, Equivalent single-wheel load, Structural design of flexible and rigid pavement; Pavement materials; Asphalt concrete mix design using Marshal and Superpave method (specifying optimum asphalt content), Pavement distresses ; Introduction to Air port pavement design.	
(090201434) Highway Material (lab)	**Prerequisite:-**

1 Credit Hr	**Co-requisite: 090201432**
Highway material test, characteristics and tests of bituminous material (asphalt), Marshal test.	
(090201452) Foundation Engineering **3 Credit Hr**	**Prerequisite: 090201324 & 0902341**
Review of basic soil mechanics, types of shallow foundations, bearing capacity of foundations: equations and correlations, settlement, geometric design of isolated footings, special types of footings, rectangular combined and strap footings and mat foundations, lateral earth pressure and retaining walls, introduction to deep foundations	
(0902451) Hydrology & Hydraulics **3 Credit Hr**	**Prerequisite: 0902252**
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, and groundwater hydrology. Open channels flow, channel geometry, steady uniform flow in open channels, energy principles in open channel (total energy and specific energy, specific energy diagram, critical flow and depth, critical slope, applications of energy principle, gradually varied flow in open channels, derivation of gradually varied flow equation, water surface profiles, computation of water surface profiles (direct step method, finite difference method), weirs and spillways, momentum principles in open channels, Hydraulic jump, fluid measurements, hydro-machinery, pumps and turbines.	
(0902453) Hydraulics Lab **1 Credit Hr**	**Co-requisite: 0902451**
Flow measurement, center of pressure, rectangular and triangular notches, Venturi and orifice meter, impact of jet, head loss in pipes, critical depth and specific energy curve, turbulent pipe flow, centrifugal pumps, axial flow pumps, hydraulic jump.	
(0902402) Computer applications in Civil Engineering **2 Credit Hr**	**Prerequisite:0106114**
Practical application for different modeling software in structural and transportation engineering, project management , water and soil.	
(0902511) Bridge Engineering **3 Credit Hr**	**Prerequisite: 090201421 & 0902415**
Types of bridges in terms of shape and material. Traffic and drainage design of bridges. Loads and load combination. Influence lines and optimum loads. 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.	
(0902591) Engineering and Filed Training **0 Credit Hr**	**Prerequisite**(***) :
Practical training in a Civil Engineering Project or any other places approved by the department, and according to the regulations drafted by the college of Engineering Training Committee	
(090201593) Graduation Project (1) **1 Credit Hr**	**Prerequisite**(***) :

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 entire project.	
(090201594) Graduation Project (2) **3 Credit Hr**	**Prerequisite: 090201593**
Planning, design, construction and management of a civil engineering project. As defined and outlined in the first phase, writing a technical report, Preparation of technical engineering drawings	
(090301211) Surveying **3 Credit Hr**	**Prerequisite:0106101**
Introduction to surveying fundamental, units of measurements and scale, chain surveying; leveling and its application in contouring, profiles and cross-sections. Areas, volumes, and earthwork calculations; Theodolite and its application in measurement of angles; traverse surveys, Traverse coordinate calculations; Theory of errors and adjustments; tacheometry and electronic distance measurements (EDM, Total station);	
(0903213) Survey/Lab **1 Credit Hr**	**Co-requisite: 090301211**
Using traditional surveying equipment like chain and measuring tape, leveling, countering, cross and longitudinal sections, measuring vertical and horizontal angles using theodolite.	
(0903311) Route and Construction Surveying **2 Credit Hr**	**Prerequisite: 090301211**
Highway types; Horizontal alignment, circular curve elements, designing and setting out of circular curve and transition curves; Super elevation; Sight distance; Stopping and passing sight distance; Designing and setting of vertical curves; coordination of horizontal and vertical curves; building construction setting out; Setting out of sewer and drainage line.	
(0903313) Route and Construction Surveying/ lab **1 Credit Hr**	**Prerequisite: 0903213** **Co-requisite: 0903311**
Setting out horizontal curves using surveying instruments; simple circular curve, compound curve, reverse curve, progressive curve, setting out building.	
(0902236) Building Materials Technology **3 Credit Hr**	**Co-requisite: 0901107**
Production, types, properties and uses of cementitious materials and aggregate. Fresh concrete properties, concrete operations, concrete testing, and destructive and non-destructive testing of existing concrete structures. Durability Aspects of Concrete. Design of concrete mixes. Production and properties of masonry units including building stones, concrete blocks and calcium-silicate and clay bricks.	
(0902238) Building Materials Technology/lab **1Credit Hr**	**Co-requisite: 0902236**
Normal Consistency & Setting Time of Cement Past; Fresh and Mechanical Properties of Mortar; Sieve Analysis of Aggregate; Specific Gravity of Aggregate; Unit Weight of Aggregate; Fresh and Mechanical Properties of Concrete; Tests on wood (Mechanical and Visual).	
(0902462) Construction Project Management **3 Credit Hr**	**Co-requisite: 0902362**

The project manager nomination and responsibilities, Project initiation, Project budgeting, Development of project work plan, Task preparing, Techniques for project planning and scheduling, , Project progress measurement and project tracking by using earned value techniques, Project cost and time evaluations, Project close out procedures, Management skills for engineering projects, safety management.	
(090201523) Seismic Hazardous Analysis **3 Credit Hr**	**Prerequisite: 090201324** **Co-requisite : 0902415**
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.	
(090201524) Pre-stressed concrete **3 Credit Hr**	**Prerequisite : 090201421**
Basic principles, short- and long-term properties of constituent materials, partial prestressing. Flexural behavior, analysis and design of prestressed concrete beams, classes, cracking, pretensioning, 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.	
(090201532) Airport Engineering **3 Credit Hr**	**Prerequisite: 090201432**
Introduction to air port engineering; Aircraft Characteristics, Airport site selection, Airport Traffic Control, Airport geometric design; Airport pavement design; Terminal design, water drainage; Airport marking, Lighting and signing.	
(090201562) Wastewater Engineering **3 Credit Hr**	**Prerequisite:**
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	
(0106114) Computer Skills 2 for Engineering Students **3 Credit Hr**	**Prerequisite: 01060110**
Algorithms and problem solution methods, Introduction at C++ programming, functions, decision maker sentences, reiteration sentences, vectors and matrixes programming, files processing, writing and maintaining programmers using C++ language at laboratory.	
(090201204) Dynamic **3 Credit Hr**	**Prerequisite: 0902201**
Study the motion of transition and rotational bodies with and without acting forces, Newton's second law, central movement of forces, the equation of energy, work, momentum, collision, conservation of energy and momentum, applications on the motion system. Acceleration and relative speed, nonlinear centre, analysis in terms of variables.	
(0902302) Communication Skills **3 Credit Hr**	**Prerequisite: 0106171**

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 design report writing procedures, preparing own resumes and CV's, practical experience on how to perform and attend interviews of work.	
(090401472) Engineering Economy **3 Credit Hr**	**Prerequisite:-**
Cost concepts and classifications, breakeven analysis, time value of money, cash-flow diagrams, interest calculations, decision making and economic selection among investment alternatives. Depreciation and income taxes. Inflation cost estimation.	
(090301203) Statistics and Engineering Probabilities **3 Credit Hr**	**Prerequisite: 0106102**
Introduction to Probability and Statistics, probability theory, methods of counting, random variables, continuous and discrete probability distribution , normal distribution, measures of central tendency and dispersion, statistical sampling methods , data representation, test hypotheses , linear regression, analysis of variance, applying and using statistical methods in engineering tasks.	