

## Courses Description

**College:** Engineering

**Department:** Civil Engineering

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**Couse ID:** 110401211      **Description:** Statics

**Full Course Description:** Vectors, force systems (2D and 3D), equilibrium of particles and rigid bodies (2D and 3D), structures (trusses, cables, frames and machines), distributed forces (centroids and centers of mass), fluid pressure, internal forces (shearing force and bending moment diagrams), friction, moment of inertia and virtual work.

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**Couse ID:** 110401214      **Description:** Engineering Mechanics

**Full Course Description:** Application of mathematical and physical principles to solve engineering problems, develop a basic understanding of forces and the effects they produce on particles and rigid bodies that are at rest, evaluate and satisfy conditions of static equilibrium, develop understanding of the behavior of solids subjected to various types of loading, shear and moment diagrams, determine the stresses, strains and displacements in structures and components due to the loads acting on them. □  
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**Couse ID:** 110401313      **Description:** Structural Analysis for Architectural students

**Full Course Description:** Structural forms, types of supports and determinacy, reactions, determinate structures, plane trusses, shear and moment diagrams for beams and frames, deflections, indeterminate structures, moment distribution method, introduction to stiffness method.

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**Couse ID:** 110401324      **Description:** Reinforced Concrete and Steel Structures for Architectural students

**Full Course Description:** Properties of concrete and steel reinforcement, dead and live loads, analysis and design for bending, shear, axial forces, one way ribbed and solid slabs, short columns, wall footings, single footings, detailing of reinforcements, properties of structural steel, analysis and design of tension and compression steel members, analysis and design of steel beams for bending and shear, detailing of simple connections structural system layouts

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**Couse ID:** 110401338      **Description:** Geotechnical Engineering Lab.

**Full Course Description:** Water content of soils, specific gravity, grain size distribution, consistency limits of soils, compaction test, field density test, coefficient of permeability of soils (constant and falling head), consolidation test, direct shear test, unconfined compression test, tri-axial test. □  
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**Couse ID:** 110401339      **Description:** Building Materials Lab.

**Full Course Description:** Introduction to testing & specifications, concrete and mortar tests, aggregate testing, fresh and hardened concrete testing, non-destructive tests, design & testing of concrete mixes, brick testing. □  
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**Couse ID:** 110401348      **Description:** Construction Contracts Administration

**Full Course Description:** Principles of construction contracts administration. Contract ingredients, project delivery approaches, bidding procedures, contract pricing formats, contract documents, specifications, drawings, bonds, subcontracting, delays, alternative methods of dispute resolution. FIDIC Conditions of Contract for Construction. □  
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**Couse ID:** 110401356      **Description:** Hydraulics

**Full Course Description:** Hydraulic machines, turbines, impulse turbines, Pelton wheel, reaction turbines, Francis turbine, Propeller and Kaplan turbines, water pumps, pressure pumps, centrifugal pump, multistage pump, propeller pump, and cavitations. Steady open channel flow, uniform flow, normal depth, Chezy and Manning equations, design of sections, specific energy, critical depth, nonuniform flow, rapidly varied flow, hydraulic jump, gradually varied flow, backwater curves

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**Couse ID:** 110401358      **Description:** Fluid Mechanics and Hydraulics Lab.

**Full Course Description:** Center of pressure on a plane surface, stability of a floating body, Venturi and orifice meters, impact of jets, flow over a rectangular notches, flow over a weirs, 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

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**Couse ID:** 110401365      **Description:** Surveying

**Full Course Description:** Principles of surveying; Tape measurements (procedures, errors, and adjustments); Leveling and its application in contouring, profiles and cross-sections; Areas, volumes, and earthwork; Measurement of angles and directions; traverse surveys, topographic surveys; Electronic distance measurements (EDM); Introduction to GPS and applications. Horizontal and vertical alignment; Setting out horizontal and vertical curves. □  
LAB: Tests on distance measurements, levels and theodolites, directions and angular measurements, topographic surveys, areas and volumes; traverse surveys; Setting out horizontal and vertical curves, Training on Total Station. □  
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**Couse ID:** 110401369      **Description:** Surveying and Building Documentation

**Full Course Description:** This course seeks to teach the students about the basic concepts of surveying and architectural documentation and their different methods and techniques. Presenting the different archiving systems according the existing international standards. Explaining the role of new technologies in surveying and documentation, through introducing the development and evolution of the different surveying and architectural documentation methods and techniques. Through a series of exercises, the students will be able to perform practical applications using surveying and documentation instruments, methods and techniques and field studies. This also includes the process of preparing the different architectura

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**Couse ID:** 110401421      **Description:** Reinforced Concrete (1)

**Full Course Description:** Properties of concrete and steel, cracked and untracked section analysis, strength design, stress block, design for bending and shear, singly, doubly reinforced sections, rectangular sections, and T-sections, design of continuous beams, load cases and moment envelopes, bond requirements, development length and bar cutoffs, one-way solid and one-way ribbed slabs, design of short columns

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**Couse ID:** 110401422      **Description:** Reinforced Concrete (2)

**Full Course Description:** Structural layout, estimation of dead and live loads, serviceability, deflections and crack control, design for torsion, design of frames, moment redistribution, slender columns, biaxial bending of columns, design of deep beams, approximate methods for two-way slabs, design of footings detailing of reinforcement

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**Couse ID:** 110401425      **Description:** Steel Structure

**Full Course Description:** Properties of structural steel, load resistant factor design (LRFD), design of tension members, design of concentric compression elements, design of beams ,beam-column elements, design of column base plates, simple welding and bolting connections.

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**Couse ID:** 110401435      **Description:** Foundation Engineering

**Full Course Description:** Site investigation, bearing capacity of shallow foundation, distribution of stresses in soils, settlement of shallow foundation, factors to be considered in foundation design, introduction to deep foundation, lateral earth pressure and retaining walls, sheet pile walls, braced excavations.

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**Couse ID:** 110401454      **Description:** Engineering Hydrology

**Full Course Description:** Hydrologic cycle and the hydrologic budget; Evaporation; Infiltration; Transpiration; Precipitation: point precipitation, aerial precipitation; Runoff; Hydrographs; Watershed characteristics; Introduction to statistical methods in hydrology; Frequency analysis; Aquifers; Darcy's law; Well hydraulics

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**Couse ID:** 110401455      **Description:** Wastewater Engineering

**Full Course Description:** Definition of pollutions as applied to water, soil and air; Basic concepts in environmental chemistry, microbiology and biochemistry; water sources; chemical, physical and biological water quality and water quality parameters; standards and criteria; population estimation; stream pollution, organic loading and oxygen depletion model; process kinetics and reactor types: CSTR, plug flow and batch reactors; continuity equation and mass balance approach; introduction to unit process and operations used in water and wastewater treatment plants

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**Couse ID:** 110401456      **Description:** Environmental Engineering

**Full Course Description:** Quantities and units; environmental systems and transformation processes; material balance relationships and reactor concepts; energy fundamentals; thermodynamics and equilibrium constants; environmental chemistry: stoichiometry, chemical equilibria, and organic chemistry; transport processes; interphase mass transfer; interphase partition phenomena: fugacity and mass transfer; water pollution; air pollution; basic environmental microbiology; mathematics of growth. □

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**Couse ID:** 110401467      **Description:** Highway Engineering lab.

**Full Course Description:** Tests on asphalt binders include: penetration, softening and flash points, ductility, viscosity, and specific gravity; Tests on subgrade soils include: CBR test, Test on aggregate include: sieve analysis, specific gravity, absorption, aggregate blending, Tests on hot mix asphalts include: Marshall mix design, extraction, skid resistance

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**Couse ID:** 110401500      **Description:** Practical Training

**Full Course Description:** a □

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**Couse ID:** 110401513      **Description:** Computer Applications in Structural Engineering

**Full Course Description:** Review of the fundamentals of the stiffness and finite elements methods, analysis and design of different types of structures using available computer packages. □  
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**Couse ID:** 110401523      **Description:** Pre-stressed Concrete

**Full Course Description:** Introduction to prestressed concrete, types and concepts of prestressed concrete, prestressing methods, types of concrete and prestressing steel, flexural analysis using elastic stresses, flexural strength analysis, partial prestressing. Flexural design of beams, beams design with load balancing. Design based on strength requirements, flexural crack control, loss of pre-stress force, composite beams. □

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**Couse ID:** 110401525      **Description:** Introduction to Earthquake Engineering

**Full Course Description:** Historical perspective of earthquake engineering. Introduction to earthquake seismology. Introduction to linear and nonlinear structural dynamics. Ductility concept and member's nonlinear behavior. Design response spectrum. Methods of lateral load analysis including but not limited to equivalent lateral force. Reinforced concrete beam, column, shear walls, and joint design issues

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**Couse ID:** 110401531      **Description:** Soil Stabilization and Ground Reinforcement

**Full Course Description:** Dynamic compaction, vibro-compaction, compaction grouting, preloading and prefabricated vertical drains, Blast-densification, lime-cement columns, vibro stone columns, vibro concrete column, jet grouting, deep mixing, Micropiles, ground anchors, fiber reinforced soils, soil nailed retaining structures, geosynthetics in ground improvement, dewatering, admixtures, geopiers

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**Couse ID:** 110401541      **Description:** Construction Planning & Scheduling

**Full Course Description:** Principles of planning, monitoring, and controlling construction projects. Developing schedules using bar charts, precedence diagrams, program evaluation and review techniques (PERT), and linear schedules. Resource histograms and s-curves. Resource allocation and resource leveling. Schedule constraints. Earned value concept. □

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**Couse ID:** 110401542      **Description:** Construction Methods

**Full Course Description:** Study of construction operations as dynamic production processes. Earthmoving materials and operation, excavating and lifting, loading and hauling operations, compacting and finishing, paving and surface treatment operations, measuring and improving productivity, construction equipment economics

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**Couse ID:** 110401543      **Description:** Construction Cost Analysis and Estimating

**Full Course Description:** Perceptions of construction cost, engineering economic analysis, risk and uncertainty, range estimating, cost fundamentals, types of cost estimating, estimating construction materials cost, estimating construction labor cost, estimating construction equipment cost, cost of concrete structures, estimating project cost, time/cost trade-off analysis, bidding strategies, cash flow analysis. □

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**Couse ID:** 110401545      **Description:** Building Construction

**Full Course Description:** Construction processes for buildings and other structures. These processes include; codes and standards, structural and architectural components and systems, formwork and bracing design, erection and assembly methods. □

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**Couse ID:** 110401551      **Description:** Surface Water Hydrology

**Full Course Description:** Advanced statistical methods in surface hydrology; Catchments, watersheds and drainage basins; Urban hydrology: approaches and effects of urbanization on runoff, peak flow methods; hydrograph routing; floods and droughts; design floods; snowmelt hydrology; Hydrologic design standards; Hydrologic simulation and Computer applications.

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**Couse ID:** 110401556      **Description:** Solid Waste Management

**Full Course Description:** What is solid wastes, characteristics of solid wastes, components of solid wastes, protection of public health, recycling, collection and transportation systems, separation, processing and conversion of municipal solid waste, disposal of solid wastes, landfills, design of landfills, leachate generation control

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**Couse ID:** 110401566      **Description:** Geographical Information System

**Full Course Description:** This course focuses on learning the basics and principles of GIS. The course presents a thorough introduction to GIS technology and linkage with map principles. It emphasizes on how spatial data can be organized, manipulated, analyzed and displayed, traditionally represented in maps, tables and aerial photographs. The course will focus on how the digital data layers are input and analyzed using GIS. Application of GIS in civil engineering

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**Couse ID:** 110401595      **Description:** Special Topics in Civil Engineering

**Full Course Description:** Special up-to-date topic in one of the civil engineering streams, (structural engineering, construction engineering & management, water and environmental engineering and highway and traffic engineering).

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**Couse ID:** 110401598      **Description:** Graduation Project (1)

**Full Course Description:** Preparation and starting of a engineering project in one of the civil engineering fields, such as; structures, water and environmental engineering, highway engineering, and construction management.□  
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**Couse ID:** 110401599      **Description:** Graduation Project (2)

**Full Course Description:** Continuation of phase (1) including; writing a technical report and drawing the project drawings and details.□  
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**Couse ID:** 150401500      **Description:** Practical Training

**Full Course Description:** a

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**Couse ID:** 170407743      **Description:** Information and Communication Technology in Crises and Disasters Management

**Full Course Description:** aa

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**Couse ID:** 1804011231      **Description:** Introduction to Physical Geology

**Full Course Description:** Earth material, rock minerals and their characteristics, rock types and classification, rock cycle, engineering properties of rocks, weathering and weathered rocks, geologic structures, site investigation, mass movement and rock slopes, earthquakes, surface and underground water, topographic and geologic maps.□  
LAB: Rock minerals, types, and classifications, geologic structures, rock logging, rock deformation and strength, rock hardness, topographic and geologic maps.□

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**Couse ID:** 1804011336      **Description:** Geotechnical Engineering

**Full Course Description:** Index and classification of soils, water flow in soils (one and two dimensional water flow), soil stresses, soil compaction, distribution of stresses in soil due to external loads, consolidation and consolidation settlement, shear strength of soils , slope stability.

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**Couse ID:** 1804011532      **Description:** Advanced Foundation Engineering

**Full Course Description:** Focuses on geotechnical design of shallow and deep foundations, including spread footings, mats, driven piles, and drilled piers. Coverage includes bearing capacity, settlement, group effects, and lateral load capacity of the various foundation types. Additional topics include construction and inspection of deep foundations, and analysis of pile behavior using wave equation and dynamic monitoring methods.

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**Couse ID:** 1804011533      **Description:** Slope Stability and Earth Retaining Structures

**Full Course Description:** Study principles of slope stability analysis, mitigation of slope failures. Review of fundamentals, lateral earth pressure, retaining walls, sheet-pile walls and braced-excavations, cantilever and anchored sheet-pile walls, reinforced earth, mechanically stabilized earth walls, and soil nail walls.

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**Couse ID:** 2004011500      **Description:** Practical Training

**Full Course Description:**

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**Couse ID:** 2104011212      **Description:** Structural Mechanics

**Full Course Description:** This course extends the analysis from external loads in statics to internal loads and deformations on structural elements and materials of civil engineering interest. The students are exposed to drawing axial, shear, force, and bending moment diagrams, and to the development of stresses and deformation due to axial, thermal, torsional, shear, bending forces. Analysis of plane stress, Mohr's Circle, combined stresses, deflection of beams, buckling of columns, and stability.□

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**Couse ID:** 2104011315      **Description:** Structural Analysis

**Full Course Description:** Structural forms, reactions, determinate structures, degree of determinacy, shear and moment diagrams for beams and frames, influence lines for beams, deflections (double integration method, principle of virtual work, and conjugate-beam methods), Analysis of indeterminate structures by approximate methods (force method, moment distribution method, stiffness method (trusses, beams, and frames)□

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**Couse ID:** 2104011337      **Description:** Building Materials

**Full Course Description:** Cement (types, manufacture, properties and hydration), aggregates, fresh concrete, hardened concrete (strength, strength development, shrinkage, creep), durability, mix design by ACI and DoE methods, brick and brick work, compliance with specifications.

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**Couse ID:** 2104011346      **Description:** Construction Project Management

**Full Course Description:** This course introduces the application of engineering and management control techniques to construction projects in order to satisfy project objectives in terms of time, cost, and quality. Network presentation and calculations, the role of networks and bar-charts in project planning, monitoring leadership in project management, project resources management, value engineering and project life cycle, and construction process optimization.

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**Couse ID:** 2104011365      **Description:** Surveying

**Full Course Description:** Principles of surveying; Tape measurements (procedures, errors, and corrections); Leveling and its application in contouring, profiles, and cross-sections; Measurement of angles and directions; Traverse surveys, Topographic surveys; Drafting and computation including calculating earthworks areas and volumes; Introduction to GPS.

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**Couse ID:** 2104011366      **Description:** Surveying Lab

**Full Course Description:** Tests on alignment, distance measurements, and error of closure in linear measurements, Training on leveling including differential leveling and contouring, Training on theodolites including directions and angular measurements, Training on Total Station including measurement of horizontal and vertical angles, find coordinates, tie distances and find areas, setup and stake out a survey. Uses of GPS receivers in surveying.

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**Couse ID:** 2104011367      **Description:** Transportaion and Engineering Planning

**Full Course Description:** Transportation systems and their characteristics; roles of transportation within different sectors; transportation planning; transportation demand modeling using 4-steps demand modeling; economics of transportation; planning of transportation facilities, systems and their characteristics□

## Courses Description

**College:** Engineering

**Department:** Civil Engineering

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**Couse ID:** 2104011368      **Description:** Highway Engineering and Design

**Full Course Description:** Pavement Materials & Design 3 Cr. Hrs (3+0) Perquisites: (110401337) □  
Pavement types (flexible & rigid), Flexible pavement materials: (bituminous materials, aggregate, and soil) properties, testing, and evaluation; Hot Mix Asphalt (HMA) mix design (Marshall and Superpave methods); Traffic and traffic assessment, Flexible pavement structural design (AASHTO 1993 method); Production, transportation, laying and compaction of hot mix asphalt; Quality control of production and acceptance of HMA mixes; Introduction to new advances in asphalt mix design (Performance-Engineered Mix Design [PEMD] method) and pavement structural design (AASHTO ME method). □

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**Couse ID:** 2104011466      **Description:** Pavement Materials and Design

**Full Course Description:**

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**Couse ID:** 2104011468      **Description:** Traffic Engineering

**Full Course Description:** Traffic Engineering 3 Cr. Hrs (3+0) Perquisites: (110401368) □  
Characteristics of highway components; traffic flow theory and models (Greenshilds' and Greenbergs'); traffic engineering studies (speed, volume, delay); analysis and operational design of unisignalized and signalized intersections using highway capacity manual (HCM); capacity analysis of highways (two way segments, Multilane highways, basic freeway segments) using HCM, statistical fundamentals of traffic crashes analysis and roads' safety.

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**Couse ID:** 2104011514      **Description:** Structural Load and Systems

**Full Course Description:** Structural Load and Systems 3 Cr. Hrs (3+0) □  
Perquisites: (110401421 & 110401425) □  
In-depth discussion of minimum design loads and load combinations including gravity, snow, wind, seismic, and moving loads. Includes an overview of various steel and concrete systems and structural drawings. Discusses load path in vertical and lateral systems and diaphragm analysis. □

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**Couse ID:** 2104011521      **Description:** Reinforced Concrete (3)

**Full Course Description:** Reinforced Concrete (3) 3 Cr. Hrs (3+0) □  
Perquisites: (110401421 & 110401425) □  
Introduction to discontinuity regions; strut-and-tie models; design of deep beams and Corbels; design of beam-column joints; design of ledge girders; design of retaining walls; design of fluid reservoirs; design of staircases and design of slab on grade. □

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**Couse ID:** 2104011522      **Description:** Advanced topics in steel structures

**Full Course Description:** Advanced topics in steel structures 3 Cr. Hrs (3+0) Perquisites: (110401425) □  
Introduction to the practical design of steel structures; composite beams and slabs, composite columns; built-up beams; built-up wide-flange sections; plate girders; building connections; design and detailing of a portal frame (hanger). □

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**Couse ID:** 2104011524      **Description:** Bridge Engineering

**Full Course Description:** Bridge Engineering 3 Cr. Hrs (3+0) Perquisites: (110401422 & 110401513) □  
This course covers the fundamentals of bridge analysis and design including conceptual design, superstructure analysis, AASHTO-LRFD bridge specifications, flat slab bridge design, R/C and pre-stressed concrete bridge design, pier design, abutment design and foundations □

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**Couse ID:** 2104011526      **Description:** Advanced Concrete Technology

**Full Course Description:** Advanced Concrete Technology 3 Cr. Hrs (3+0) □

Perquisites: (110401337 & 110401339)□

Introduction to Concrete Technology, Cracking of Concrete, Structural Lightweight Concrete, High-Strength and High-Performance Concrete, Self-Consolidating Concrete, Shrinkage-Compensating Concrete, Fiber-Reinforced Concrete, Pervious Concrete, Shotcrete, Heavyweight Concrete for Radiation Shielding, Mass Concrete, Self-Healing Concrete, Roller-Compacted Concrete, Concrete Sustainability, and Green Concrete, Concrete 3D Printing□

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**Couse ID:** 2104011543      **Description:** Construction Cost Analysis and Estimating

**Full Course Description:**

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**Couse ID:** 2104011546      **Description:** Automation in construction management

**Full Course Description:** Automation in construction management 3 Cr. Hrs (3+0) □

Perquisites: (110401346)□

This course discusses the increased research and development in adopting advanced technologies in construction projects. This includes the utilization of various advanced technologies like building information modeling, knowledge modeling, artificial intelligence, sensing, virtual reality, augmented reality, and robotics□

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**Couse ID:** 2104011551      **Description:** Hydraulic Structures

**Full Course Description:** Hydraulic Structures 3 Cr. Hrs (3+0) Perquisites: (110401356)□

This course discusses knowledge and the ability to analyze and design some important hydraulic structures. In specific, topics related to dam types and selection, dam forces analysis, dam seepage and foundation treatment, spillways, culverts types and design, flood control, and structure protection works will be covered in this course.□

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**Couse ID:** 2104011554      **Description:** Water and Wastewater Treatment

**Full Course Description:** Water and wastewater treatment 3 Cr. Hrs (3+0) Perquisites: (110401455)□

This course will provide students with better knowledge of aquatic chemistry, principals of chemical reactions, chemical equilibrium, and reactors analysis. Physical and chemical water quality parameters. Introduction to environmental microbiology. Coagulation, flocculation, sedimentation, softening, and filtration. Sorption, adsorption, and ion exchange. Disinfection and DBPs analysis. Oxidation/advance oxidation strategies. Field trip to the wastewater treatment plant. □

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**Couse ID:** 2104011563      **Description:** Pavement Management Systems

**Full Course Description:** Pavement Management Systems 3 Cr. Hrs (3+0) Perquisites: (110401466)□

Pavement management systems (PMS) concepts and components; flexible and rigid pavement distresses (types & causes); pavement condition survey and rating procedures; pavement structural and nonstructural evaluation; Computer application in pavement performance assessment; pavement preservation, maintenance, and rehabilitation treatments techniques; selection of feasible preservation and rehabilitation alternatives; field survey and visits.□

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**Couse ID:** 2104011564      **Description:** Traffic Crashes & Analysis

**Full Course Description:** Traffic Crashes & Analysis 3 Cr. Hrs (3+0) Perquisites: (110401468)□

Traffic safety concepts; identifying traffic safety problem which includes data collection and concepts of analysis; identification of countermeasures; prioritizing projects; implementation and evaluation of safety projects□



Courses Description

College: Engineering  
Department: Civil Engineering

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Couse ID: 2104011568	Description: Advanced Pavement Materials
Full Course Description:	Advanced Pavement Materials 3 Cr. Hrs (3+0) Perquisites: (110401466)□ Superpave aggregate gradations, tests, and criteria; Superpave asphalt binder testing and modification; Superpave binder specification (Performance Grade [PG] -Grading System); Superpave mix design system; Hot Mix Asphalt (HMA) performance assessment tests and fundamental mechanical properties; Performance-Engineered Mix Design [PEMD] method (or Balanced Mix Design [BMD]); Pavement recycling; Special mixtures, and additives. □