

المحتوى العلمي للمقررات الدراسية الملزمة للهندسة المدنية
Description of Course Content for Civil Engineering

CE 220 Strength of Materials I (3 Units):
GE 140

Prerequisite:

Introduction and Definitions, Axial force, Shear force and Bending, Moment in Beams, Engineering Cross-Section properties for structural members, Determining of the Centroid and Second moment of area, Simple stresses and simple strains, Torsion of Circular cross sections.

CE 210 Building Materials (3 Units):

Prerequisite:

Theoretical Part: Introduction and Definitions, Cement (Manufacturing, Types, Specifications), Hydration of cement with water, Aggregate (Characteristics and Specifications), Water (for washing, mixing and curing), Admixtures, Wood, Steel, Bituminous Materials, Miscellaneous Materials.

Laboratory Part: Aggregate Tests to determine (Moisture Content of Fine Aggregate, Moisture Content of Coarse Aggregate, Specific Gravity and Absorption of Fine Aggregate, Specific Gravity and Absorption of Coarse Aggregate, Abrasion Test for Coarse Aggregate using Los Angeles Machine, Bulk Density and Void Ratio for Fine Aggregate, Bulk Density and Void Ratio for Coarse Aggregate, Sieve Analysis for Fine Aggregate, Sieve Analysis for Coarse Aggregate), Cement Tests (The Fineness of Cement, The Normal Consistency, Initial and Final Time of Set , Density and Specific Gravity of Cement) , Bricks Tests (Compressive Strength, Absorption Test).

CE 215 Concrete Technology (3 Units):
CE 210

Prerequisite:

Theoretical part: Definitions and classification, Fresh concrete (Consistency, Workability, Bleeding), Segregation of aggregate, Hardened Concrete Strength (Compressive Strength, Tensile Strength, Shear Strength, Bond with reinforcement, Factors affecting strength), Elasticity, Durability, Creep and Shrinkage of concrete, Mix Design (Trial Method, ACI Method, British Method).

Laboratory Part: Cement Mortar Tests (Compressive Strength of Cement Mortar, Tensile Strength of Cement Mortar), Fresh Concrete Tests (Slump Test, Compacting Factor Test) Hardened Concrete Tests (Cubic Compressive Strength, Cylinder Compressive Strength, Split Cylinder Test) Trial Mix Design, ACI Method for Mix Design.

CE 221 Strength of Materials II (2 Units):
CE 220

Prerequisite:

Bending stresses in beams, design of beams for bending, bending about two principals' axes with or without an axial force, bending about two not principal axes, shearing stresses in beams Composite beams (Analysis of composite beams using transformed section method, Reinforced concrete sections) Equivalent and principal stresses, Normal principal stresses, Mohr's circle of stresses (Analytical and Graphical methods).

GE 249 Engineering Geology (2 Units):

Prerequisite:

Introduction, Origin and Structure of the Earth, Minerals and Rocks, Igneous, Sedimentary and Metamorphic Rocks, Different Process on Rocks, Earthquakes and Volcanoes, Rocks Deformation types, Ground Water and it's System, Structure of Soil and Rocks, Land Slides, it's Reasons and the Engineering, Geological solution, Geological Engineering for Major Projects.

CE 240 Surveying I (3 Units):

Prerequisite:

Basic principles of Surveying, Plan scales and ordnance of survey maps , Linear surveying , simple optics, principal parts of survey instruments, Leveling and vertical sections , contouring , Random Errors and Theory of Least Squares.

CE 250 Fluid Mechanics I (3 Units):

Prerequisite:

GE 140

Properties of fluids, Fluid pressure and its measurements, Hydrostatics and its applications, Equilibrium of floating bodies, Fluid masses subjected to acceleration, Hydrokinematics of fluids, Bernoulli equation and its applications, Momentum equation and its

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Description of Course Content for Civil Engineering

CE 322 Theory of Structures I (3 Units):

Prerequisite:

CE 221

General Introduction (Structural Analysis, Loads on structures), Analysis of statically determinate structures (Beams, Frames, Arches, Trusses), Deflections in statically determinate Beams (Basic methods), Deflections of statically determinate Beams and Frames (Geometric Methods (The Moment Area and Conjugate Beam methods), Energy methods (Real and Virtual work methods) .Deflections in statically determinate trusses.

CE 370 Soil Mechanics I (3 Units):
GE 249

Prerequisite:

Introduction (Historical Development), Nature of Soil, Phase (Weight- Volume) Relationship, Particle Size Characteristics, Atterberg Limits, Soil Classification, Capillarity and Permeability (Water in Soils), Principle of Effective Stress, Consolidation and Consolidation settlement, Shear Strength and Failure Criteria, Stress Distribution in Soils, Laboratory Tests for Physical and Mechanical Properties of Soils.

CE 351 Fluid Mechanics II (3 Units):
CE 250

Prerequisite:

Types and specifications of flow, Flow over weirs, Losses of total energy of the flow, Steady flow in pipes, Uniform flow through open channels, Dimensional analysis, Model analysis.

Laboratory Part: Experiments on: properties of fluids; statics of fluids; principles of continuity, Bernoulli, energy, and momentum; viscous effects; free surface flow.

CE 341 Surveying II (3 Units):
CE 240

Prerequisite:

Bearings, The direction of a line, Theodolites, Theodolite traverse, rectangular coordinates, Tachometry, Electronic distance measurement (EDM), Curve ranging, horizontal and vertical curves, Areas and volumes.

CE 300 Civil Engineering Drawings (2 Units):
GE 143

Prerequisite:

Introduction, the principal components of civil engineering construction the components of building, Footings, Wall footing (plain & Reinforcement), Isolated footing, combined footing (rectangular & trapezoid), Raft foundation with conversely beam (up & down), Piles footing, Pier footing.

CE 344 Highway Engineering I (3 Units):
CE 341

Prerequisite:

Introduction, Vehicle Characteristics, Resistance and Driving force. Highway Types, Preliminary Design and Highway Design procedure, Geometric Design of Highways, Horizontal Alignment of Highways, Types of horizontal Curves, Sight Distance, widening of carriage way on Curves, Vertical Alignment, Types of vertical Curves, Design of vertical Alignment, Planning of Longitudinal Super elevation in cross section, Computation of Earthwork, Area of various cross – section, Computation of volumes, Intersection and interchanges Types

CE 323 Theory of Structures II (3 Units):
CE 322

Prerequisite:

Introduction to Statically Indeterminate Structures (Advantages and disadvantages, Method of Analysis), Analysis of statically indeterminate beams and frames using the

Consistent Deformation method, Analysis of trusses using the Consistent deformation method, The Three moment equation for the analysis of continuous beams and frames, Buckling and Stability of columns, Selected topics.

CE 328 Reinforced Concrete Design I (3 Units):
CE 221

Prerequisite:

Review of properties of structural concrete and reinforcing steel, Analysis and Design of R.C. beams using ultimate strength method, Analysis and design of R.C. elements for shear, Analysis and design of R.C. elements for torsion, Bond, Anchorage, and development length. Design of continuous beams. Short columns subjected to axial loads, Detailing of reinforced concrete beams and columns.

CE 301 Construction And Architecture (3 Units):

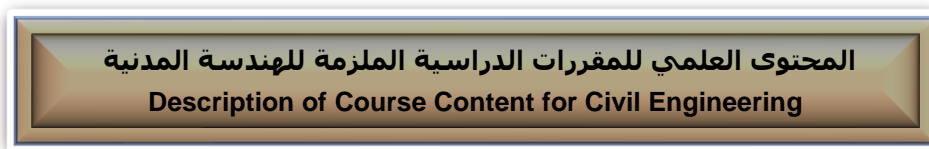
Prerequisite:

Introduction to Buildings Construction, Architecture and its role, The Factors that affected Architecture (Climate, Social, religion), Types of Buildings, Architectural and structural details, Damp proofing, Sound Insulation, Heat insulation, Finishing of Walls and Ceilings, Doors and windows, Means of Moving Between Levels, Stairs, Lifts, Ramps, Moving Stairs, Joints in Buildings, Construction Joints, Expansion Joints.

CE 371 Soil Mechanics II (3 Units):
CE 370

Prerequisite:

Compaction and Stabilization, Lateral Earth Pressure Retaining walls. Techniques and Evaluation of subsurface Conditions, Bearing Capacity of Soil and Rock, Slope Stability.



CE 445 Highway Engineering II (3 Units):
CE 341

Prerequisite:

Highway Materials, Soils, Soil classification for Highway purposes, Testing of soil strength, Soil stabilization, Aggregates, Requirement of a good highway Aggregate, Binder for Highway construction, Bituminous Materials, Testing of Bituminous Materials, Bituminous Pavement, Component parts of highway pavement structure, Types of highway Pavement, Preparation of Subgrade.

CE 457 Sanitary Engineering I (3 Units):
CE 351

Prerequisite:

Introduction: work of the sanitary engineer; Water demand: domestic, public, commercial, industrial and fire demand; Water quality; Various sources of water: surface and ground water sources; Water intakes; Conventional water treatment processes: coagulation, flocculation, sedimentation, filtration (rapid and slow sand filters), and disinfection; Hydraulic analysis of water distribution systems (Hardy Cross method) and reservoir design; Flow and characteristics of wastewater; Design of a storm collection system; Design of a sewerage system; Introduction to wastewater treatment processes: physical, chemical and biological; Introduction to biological wastewater treatment systems: activated sludge systems, trickling filters, oxidation ditches, stabilization ponds, septic tanks.

CE 476 Foundation Engineering I (3 Units):
CE 371

Prerequisite:

Introduction to the Footing, General Principles of Foundation Design , Types of Footing, Spread Footing Design, Wall Footing Design, Eccentrically Loaded Spread Footings, Combined Footing Design, Cantilever or Strap Footing ,Tie-Beams, Raft Foundation, Settlement analysis of Shallow Foundation .

CE 429 Reinforced Concrete Design II (3 Units):
CE 328

Prerequisite:

Analysis and design of one-way slab systems , analysis and design of two way slabs using ACI coefficient method , Analysis and design of R.C. elements for torsion, Columns subjected to axial load and uniaxial or biaxial moments, design of concrete sections subjected to tension without or with bending, Staircases, Design project.

CE 435 Design of Steel Structures I (3 Units):
CE 221

Prerequisite:

Introduction, Types of Steel Structure, Properties of Steel, loads and Specification, Steel sections, Limit state Design, Connections, Design of Tension and Compression Members, Design of Simply Supported Beams.

CE 502 Computer Applications in Civil Engineering (3 Units):
Prerequisite: ---

Part A: Writing Computer Programs using BASIC or VISUAL BASIC in Civil Engineering (Structural Analysis, Reinforced Concrete Design, Steel Structures Design, Foundation Engineering, Fluid Mechanics).

Part B: Training on using Ready Softwares (for example STAAD-III, EXCEL, AUTOCAD and other useful softwares)

Part C: Use of INTERNET in Search about Civil Engineering Topics.

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Description of Compulsory Courses for Structures & Materials Division

CE 477 Foundation Engineering II (3 Units): **Prerequisite:**
CE 476

Design of Retaining Walls, Introduction to Deep Foundation, Pile Foundation (Classification of Piles, Description of Pile Types, Structural Design of Piles, Static Pile Capacity, Single Piles, Dynamic Analysis, Pile Load Test, Pile Groups) Walls for Excavations, Drilled Piers or Caissons.

CE 482 Construction Planning, Equipment's and Methods (3 Units):
Prerequisite: ---

Introduction, Project Planning and managements, Project control during construction, Factors effecting the selection of construction Equipment, Tractors and Related Equipment, Scrapers, Excavating Equipment, Loading, Hauling, And Lifting Equipment, Paving, Compaction and finishing Equipment, Drilling and pumping Equipment, Piles and pile driving equipment, Concrete form design.

CE 430 Reinforced Concrete Design III (3 Units): **Prerequisite:**
CE 429

Design of long R.C. columns, Analysis and design of two-way slab systems using the ACI direct design method, Deep Beams, Corbels, Analysis of R.C. sections using Working Stress Method, Serviceability, Deflections and Cracking, Design project.

CE 424 Theory of Structures III (3 Units): **Prerequisite:**
CE 323

The Slope Deflection method and The Moment Distribution Method (Analysis of statically indeterminate beams, frames, effect of settlement, Frames with sidesway), Influence Lines and Moving Loads for statically determinate Beams, Influence Lines for statically Indeterminate Beams, Approximate Methods for analysis of statically indeterminate frames (Portal frame method, Cantilever Method).

Laboratory part: Experimental tests on trusses, beams, frames, stability of columns.

CE 436 Design of Steel Structures II (3 Units): **Prerequisite:**
CE 435

Beams Compound Beams, Crane Beams, Purlins, Sheeting Rails, Plate Girders, Beam Columns, Slide Column for a Single Storey Industrial Building, Crane Columns, Column Bases, Trusses.

CE 525 Matrix Analyses of Structures (3 Units):
CE 424

Prerequisite:

Introduction, Basic Concepts of Matrix Stiffness Method, Analysis of Pinned-Jointed Trusses, Analysis of continuous Beams, Analysis of Frames, Composite structures, Additional topics in Matrix stiffness method, Computer applications, Introduction to Matrix flexibility method.

CE 581 Engineering Management and Economy (3 Units):
Prerequisite: ---

Management of Project (Concept, Stage of Project Management , Network Analysis), Critical Path Method (Concept, Stage of CPM, Usage of Liner Program in Critical Path), Project Crashing,(Normal Time, Crashed Time, Normal Time, Crash Cost), Program Evaluation & Review Technique (Concept, Stages of PERT, Usage of PERT, Probability Distribution, Expected Time), PERT/ Cost Control (PERT/Cost Technique, Stages of PERT/Cost, Control of Cost, Project Productivity Approach), Project Scheduling (Loading leveling, Limited Resource Model, Heuristic Methods), Materials Management, (Concept of Materials Management, Important of Materials Management, Objectives of Materials Management, Functions of Materials Management).

CE 599 Engineering Project (4units):
Dep. Approval

Prerequisite:

The class objective is to provide experience in the application of engineering principles to the solution of a specific problem in Civil Engineering. Students are required to select a topic and prepare a proposal, including a work programme for a project to be undertaken under the supervision of a faculty member. Projects may include laboratory or field experiments, design problems, computer analysis or literature reviews. Students are expected to prepare a typewritten report and to make an oral presentation of their project.

CE 531 Prestressed Reinforced Concrete (3Units):
CE 530

Prerequisite:

Properties of P.R.C, Prestressing methods, Development of prestressed R.C. Theory, Properties of materials used in P.R.C, Losses in prestressing, Study of determinate P.R.C. elements subjected to bending and shear, Study of Indeterminate P.R.C. elements, End-Blocks for P.R.C. elements.

CE 583 Contracts and Specifications (3Units):

Prerequisite:

Legal aspects of construction contracts, classification of contracts, types of contracts, General and Special Conditions of Contracts, Claims and dispute resolution, standard Contracts, Specification of Construction material, standards, Common used standards. Quantity surveying for civil engineering work, Estimating of construction pries and costs.

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Description of Elective Courses for Structures & Materials Division

CE 532 Reinforced Concrete High Rise Buildings (2 Units): Prerequisite:
CE 530

Introduction, High - rise buildings structural frames, Loadings on High Rise Buildings, Analysis methods for high - rise building, Safe lateral deflection for H.R.B., Stability of H.R.B.

CE 527 Bridge Engineering (2 Units): Prerequisite:
CE 430

Types of bridges; loads on bridges, analysis and design of reinforced concrete slab and girder type bridges, precast prestressed concrete bridge, metallic bridges. Substructure design. Construction details.

CE 516 Testing of Concrete in Structures (2 Units): Prerequisite:

Planning and interpretation of in-situ testing, Surface hardness methods, Ultrasonic methods, Penetration resistance methods, Cores. Load testing, miscellaneous test methods for properties other than strength, Chemical testing and allied testing techniques, typical case studies.

CE 517 Advanced Concrete Technology (2Units): Prerequisite:

Mix design, field practices and quality control, temperature, shrink-age, creep and fatigue, modulus or rupture, lightweight and heavy-weight concrete, additives and admixtures, underwater concreting, prefabrication in concrete.

المحتوى العلمي للمقررات الملزمة لشعبة هندسة الهيدروليك والبيئة
Description of Compulsory Courses for Hydraulic & Environmental
Engineering Division

CE 462 Surface Water Hydrology (3 Units):
CE 351

Prerequisite:

Definition and Development of Hydrology, The Hydrologic Cycle, Hydrologic Processes, Precipitation and Measurement Methods, Methods of Calculating Precipitation Mean Depth an Specific area, Evaporation and Evapotranspiration, Water shads and it's characteristics, Methods of Calculating Maximum Surface Runoff, Hydrograph and Unit Hydrograph, Floods and Methods of Calculating Design Floods, Stream Flood Routing.

CE 458 Sanitary Engineering II (3 Units):
CE 457

Prerequisite:

Advance treatment processes of drinking water: softening, removal of ferrous and manganese, control of taste and odor, and reduction of dissolved salts (seawater desalination); Pumps and pumping stations in water distribution systems; Pumps and pumping stations in wastewater collection systems; Conventional biological treatment of wastewater: aerobic and anaerobic removal of organic matter; Advance biological wastewater treatment processes: nitrification and denitrification, phosphorus removal;

Design of biological wastewater treatment systems: (i) completely mixed activated sludge system - with and without nitrogen removal, and (ii) stabilization ponds; Sludge treatment and disposal; Refuse collection and disposal; Reuse of wastewater.

CE 463 Irrigation and Drainage (3 Units) :
CE 351

Prerequisite:

Irrigation and soil nature, Water consumption and plants irrigation requirements, Irrigation systems, Design of open channel irrigation system, Surface irrigation, Sprinkler irrigation, Drip irrigation, Subsurface irrigation, Importance for drainage for the cultivation land, subsurface drainage, Tile drainage, Elevation drainage by wells.

CE 452 Hydraulic Structure I (3 Units):
CE 351

Prerequisite:

Lining of canals, Control structures and canals, Weirs, Spillways, Control of flow by gates, Hydraulic design of the apron of the control structure, Seepage of flow under control structures, Piping phenomenon downstream control structures, Scour downstream control structures.

CE 482 Construction Planning, Equipment's and Methods (3 Units):
Prerequisite: ---

Introduction, Project Planning and managements, Project control during construction, Factors effecting the selection of construction Equipment, Tractors and Related Equipment, Scrapers, Excavating Equipment, Loading, Hauling, And Lifting Equipment, Paving, Compaction and finishing Equipment, Drilling and pumping Equipment, Piles and pile driving equipment, Concrete form design.

CE 581 Engineering Management and Economy (3 Units):
Prerequisite: ---

Management of Project (Concept, Stage of Project Management , Network Analysis), Critical Path Method (Concept, Stage of CPM, Usage of Liner Program in Critical Path), Project Crashing,(Normal Time, Crashed Time, Normal Time, Crash Cost), Program Evaluation & Review Technique (Concept, Stages of PERT, Usage of PERT, Probability Distribution, Expected Time), PERT/ Cost Control (PERT/Cost Technique, Stages of PERT/Cost, Control of Cost, Project Productivity Approach), Project Scheduling (Loading leveling, Limited Resource Model, Heuristic Methods), Materials Management, (Concept of Materials Management, Important of Materials Management, Objectives of Materials Management, Functions of Materials Management).

CE 543 Hydraulic Structures II (3Units): Prerequisite:
CE 452

Crossing-up structures, Bridges (Timber, Steel, R.C), Culvert Structures, Siphon structures, Aqueduct Structures, Dams, Gravity dams, Buttress dam, Earth dam, Rock fill dam, Arch dam.

CE 583 Contracts and Specifications (3Units): Prerequisite:

Legal aspects of construction contracts , classification of contracts , types of contracts , General and Special Conditions of Contracts , Claims and dispute resolution , standard Contracts, Specification of Construction material , standards, Common used standards. Quantity surveying for civil engineering work , Estimating of construction pries and costs .

CE 564 Harbor and Coastal Engineering (3Units): Prerequisite:

Introduction to harbor engineering and main structures, Costal hydrodynamics, planning of ports, Break Waters, Berth Structures.

CE 599 Engineering Project (4units): Prerequisite:
Dep. Approval

The class objective is to provide experience in the application of engineering principles to the solution of a specific problem in Civil Engineering. Students are required to select a topic and prepare a proposal, including a work programme for a project to be undertaken under the supervision of a faculty member. Projects may include laboratory or field experiments, design problems, computer analysis or literature reviews. Students

are expected to prepare a typewritten report and to make an oral presentation of their project.

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Description of Elective Courses Content for Civil Engineering

CE 555 Fluid Mechanics III (2Units):
CE 351

Prerequisite:

Twodimension flow theory, Stream line, Stream function, Physical measuring of the stream function, Potential function, Continuity equation in hydrodynamic, Euler equation of motion of flow, Laplace equation, flow net flow through porous media, graphical solution of the flow net.

CE 565 Ground water Hydrology (3Units):
CE 351

Prerequisite:

Importance of ground water, Sources of ground water, Types of layers containing ground water, Wells, types of wells, Design of wells.

CE 566 Water Resources Engineering and Environment (3 Units):
CE 351

Prerequisite:

Water laws, Reservoirs, Dams, Hydropower generations, Flood routing and control, Water resources environment, heating pollution of water, Reuse of water.

المحتوى العلمي للمقررات الدراسية لشعبة الهندسة الجيوتقنية وهندسة الطرق
Description of Compulsory Courses for Geotechnical & Transportation
Engineering Division

CE 477 Foundation Engineering II (3 Units):
CE 476

Prerequisite:

Design of Retaining Walls, Introduction to Deep Foundation, Pile Foundation (Classification of Piles, Description of Pile Types, Structural Design of Piles, Static Pile Capacity, Single Piles, Dynamic Analysis, Pile Load Test, Pile Groups) Walls for Excavations, Drilled Piers or Caissons.

CE 482 Construction Planning, Equipment's and Methods (3 Units):
Prerequisite: ---

Introduction, Project Planning and managements, Project control during construction, Factors effecting the selection of construction Equipment, Tractors and Related Equipment, Scrapers, Excavating Equipment, Loading, Hauling, And Lifting Equipment, Paving, Compaction and finishing Equipment, Drilling and pumping Equipment, Piles and pile driving equipment, Concrete form design.

CE 446 Traffic and Transportation Engineering (3 Units):
CE 455

Prerequisite:

Traffic studies, Purposes of traffic studies, Information to be collected during traffic studies, Traffic volume study, objects of traffic volume study, collection of traffic volume count data, Representation of traffic volume count data, Traffic control devices, types of traffic control devices, Traffic signs, markings, and signals, Advantage and disadvantage of providing traffic signals, origin and Destination .Urban transportation planning, Transportation systems modeling, Trip generation, Trip distribution, Mode split models, Cost of highway transportation, Present value concepts, Operating expenses, Fixed and variable costs, Rate of return, Annual costs, Capital recovery.

CE 442 Surveying III (3 Units):
CE 341

Prerequisite:

Geodetic Surveying: Intersection Methods for Computation Rectangular coordinates, Computation Elements Spherical Triangles, Computation geographic coordinates of Spherical triangles, Computation Distances between two points on spherical surface. Cartography: Coordinate References System on the Spherical, Distortions Classification of Projections and their properties, Cylindrical and Conical Projections, Project.

CE 472 Soil Subsurface Exploration (3 Units):
:CE 371

Prerequisite:

Subsurface exploration program. Boring and sampling, coring of rocks, preparation of boring logs, test pits and trenches, determination of the coefficient of permeability in the field, field vane shear test, cone penetration test, the use of the pressure meter; test and interpretation of test results, geophysical exploration; electrical receptivity, and seismic refraction methods.

CE 581 Engineering Management and Economy (3 Units):
Prerequisite: ---

Management of Project (Concept, Stage of Project Management , Network Analysis), Critical Path Method (Concept, Stage of CPM, Usage of Liner Program in Critical Path), Project Crashing,(Normal Time, Crashed Time, Normal Time, Crash Cost), Program Evaluation & Review Technique (Concept, Stages of PERT, Usage of PERT, Probability Distribution, Expected Time), PERT/ Cost Control (PERT/Cost Technique, Stages of PERT/Cost, Control of Cost, Project Productivity Approach), Project Scheduling (Loading leveling, Limited Resource Model, Heuristic Methods), Materials Management, (Concept of Materials Management, Important of Materials Management, Objectives of Materials Management, Functions of Materials Management).

CE 547 Railway Engineering (3Units):
CE 445

Prerequisite:

Introduction , Resistance and Tractive efforts, Railway track, Rails, Rail Joints, Sleepers, Rail to sleeper fastening, Railway Curves, Ballast, Subgrade and Embankments, Tack alignments, Surveying, Geometric Design of Track, defects and Failure in railroad, subgrade embankments, Railway stations.

CE 599 Engineering Project (4units):
Dep. Approval

Prerequisite:

The class objective is to provide experience in the application of engineering principles to the solution of a specific problem in Civil Engineering. Students are required to select a topic and prepare a proposal, including a work programme for a project to be undertaken under the supervision of a faculty member. Projects may include laboratory or field experiments, design problems, computer analysis or literature reviews. Students are expected to prepare a typewritten report and to make an oral presentation of their project.

CE 583 Contracts and Specifications (3Units):

Prerequisite:

Legal aspects of construction contracts , classification of contracts , types of contracts , General and Special Conditions of Contracts , Claims and dispute resolution , standard Contracts, Specification of Construction material , standards, Common used standards. Quantity surveying for civil engineering work , Estimating of construction pries and costs

CE 573 Soil Stabilization (3 Units):
: CE 371

Prerequisite:

Purposes of soil stabilization, mechanical stabilization, cement stabilization, asphalt stabilization, lime stabilization, chemical stabilization, preloading and vertical sand drains, reinforced earth, reinforced retaining walls, stabilization by heating, grouting, blasting,

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Description of Elective Courses for Geotechnical & Transportation Engineering Division

**CE 578 Highway Maintenance (2 Units):
CE 445**

Prerequisite:

Road Maintenance, pavement failures, classification of road maintenance jobs, Maintenance of road pavements, Maintenance of earth roads, Maintenance of shoulders and sides, Maintenance of flexible and rigid pavements.

**CE 574 Slope Stability Analysis (2 Units):
CE 371**

Prerequisite:

Landslide types and processes, landslide triggering mechanisms, Theory of stability analysis of slopes, Effective stress stability analysis" (ESSA), Undrained shear strength analysis (USSA), problem solutions using hand calculations & the latest computer codes, Stabilization of slope, case studies.

**CE 575 Rock Mechanics (2 Units):
CE 371**

Prerequisite:

Physical properties and classification of intact rock, theories of rock failure, state of stress in the earth's crust, time-dependent behavior of soft rock, compressibility, effect of geologic discontinuities on rock strength; and introduction to stability analyses in rock.