General and Construction Sites
In particular, Site Investigation

PREREQUISITE: CT 151 & CT 163

CT 375: Rock Mechanics, 3 (2, 1, -)

Physical basis of strength in rock. Elastic, plastic, brittle
and creep behavior. Measurement of static and dynamic properties
in field and laboratory. Application of rock mechanics to civil
engineering problems. General characteristics of Local limestone.

PREREQUISITE: CT 151 & CT 222.

CT 379: Selected Topics in Geotechnical Engineering, 3 (2, 1, -)

A Selection Made From: Soil Stabilization Using
Conventional Stabilizers, such as Cement, Bituminous Materials
& Chemicals. Soil Improvement by: Compaction, Vibroprobes,
Preloading etc. Desert Soil Characteristics Including Swelling &
Shrinkage, Desiccation, Collapse, Erosion & Cementation. Salt-
bearing Soils, Cemented Sands & Wind-Blown Sands. Influence
of water Table Fluctuation on Soil Properties. Soil Properties by
Field Tests. Use of Geomembranes & Geotextiles.

PREREQUISITE: CT 163

CT 381: Advanced Technologies for Construction, 3 (2, 1, -)

Advanced technologies including microcomputer systems,
management information systems, automation technologies,
computer aided design, & expert systems & their application in the
construction industry. Overview of systems acquisition,
communications, & networking.

PREREQUISITE: CT 223 & CT 215

CT 383: Construction Management, 3 (2, 1, -)

The nature of construction industry. Construction
administration. Factors affecting the selection of construction
equipment. Construction equipment & methods, work improvement
in construction management. Cost estimation. Concrete forms.
Safety in construction.

PREREQUISITE: CT 200

CT 385: Selected Topics in Construction Engineering, 3 (2, 1, -)

Selection made from: Construction Planning, Scheduling
& Control. Construction Contract Documents, Specifications,
Agreements & General Conditions. Construction Equipment.
Erection Methods, Design & Application of Concrete For work.
Construction Materials with Emphasis on Concrete. Value
Engineering & Logistics. Selected Case Studies.

PREREQUISITE: MNG 101 & CT 211.

FTR 101: Field Training (1), 5 (+, -, 30)

Training shall concentrate on brick work, using different
types of blocks & different techniques. The student shall try to
apply such techniques manually if possible. The student shall be
trained to use the surveying equipment, which he studied at the
institute, to prepare & plan the site.

PREREQUISITE: ITR 001

FTR 102: Field Training (2), 5 (+, -, 30)

The student shall be trained on how to execute reinforced
concrete buildings; concrete mix design on site; the use of different
mixing methods, such as manual, mechanical & the manner to employ
the central mix station technique. Also the student shall be trained to
design & construct the shuttering for different concrete elements.

PREREQUISITE: FTR 101

FTR 201: Field Training (3), 5 (+, -, 30)

The student shall be trained to control the work & manage
its different stages on site with the following: Communicate with
different types of workers; Reviewing quantities, prices & quality
control; Training to read drawings & apply it on site; Planning &
management of the site to guarantee to finish all works on time.

PREREQUISITE: FTR 102

FTR 202: Field Training (4), 5 (+, -, 30)

The student shall be trained to execute the following: Prepare
design calculation sheets; Prepare design drawings & working details
to be used on site; Prepare all notes related to the works to guarantee
the execution of all works according to project specifications.

PREREQUISITE: FTR 201
DEPARTMENT OF CIVIL ENGINEERING

Chairman : Ahmed Azmy

The Department of Civil Engineering administers a five-year program designed to develop the professional competence of a diverse student body by breadth of study, to prepare students for the practical solution of the technical problems of society while considering the ethical, social and economic implications of their work. As one of the oldest professions in history, Civil Engineering encompasses a broad array of specialized fields within the three general disciplines which are: (1) structural & construction engineering, (2) public works including environmental engineering & (3) hydraulics & water resources engineering. The curricula in Civil Engineering provide a balanced program in mathematics, basic sciences, engineering sciences, engineering design & social sciences & humanities.

The department grants its graduating students the degree of Bachelor of Science in Civil Engineering, after completion of 211 credit units, including 44 credit units in the preparatory program, in approximately five years. A Diploma may be earned after completion of 127.5 credit units in a minimum of three years, including the preparatory year.

Graduation Requirements
Engineering students need to complete 44 credits in the preparatory year consisting mainly of basic sciences, languages & introductory technical courses of general engineering nature. The Civil Engineering student is required to complete an additional 83.5 credit units to obtain a diploma or an additional 167 credit units to earn a Bachelor Degree in Civil Engineering.

Facilities & Laboratories
The Department of Civil Engineering maintains several laboratories used by faculty members in carrying out their teaching duties. These laboratories are:
- Concrete Testing Laboratory
- Material Testing Laboratory
- Soil Mechanics Laboratory
- Structural Engineering Demonstration Laboratory
- Surveying Laboratory
- Hydraulics Laboratory
- Computer Facilities

In the following is a brief description of each of these Laboratories:

Concrete Testing Laboratory
The lab is fitted with equipment for testing concrete mixes & reinforced concrete in fresh & hardened states, as well as, equipment for non-destructive testing of concrete. The lab is also equipped with a 2000 KN compression machine, concrete test hammer, concrete cover meter for locating reinforcement bars, concrete mixers, vibrating tables, an accelerated curing tank, a core drilling machine, gradation sieve sets and other miscellaneous pieces of equipment.

Material Testing Laboratory
The lab is fitted with equipment for testing building materials: Aggregates, cements, steel bars, bricks, stones, etc.

Soil Mechanics Laboratory
This lab contains equipment for soil classification tests, compaction tests, triaxial tests for soils and rocks, direct shear tests, permeability tests, consolidation and swelling tests. Other pieces of equipment are available for measuring bearing capacity and moisture content in addition to an assortment of ovens and measuring scales.
Structural Engineering Laboratory

In this lab, experiments can be performed on small models to demonstrate shear, bending and deformation of beams, bending and deformation of frames, forces and deformation of trusses and buckling of structural elements. The lab is equipped with a beam apparatus, truss apparatus with 5 KN loading capacity, frame apparatus and strut apparatus, in addition to various sensors, strain gauges, data loggers and software packages. The lab serves courses in structural analysis and mechanics.

Surveying Laboratory

This lab offers capabilities for surveying, photogrammetry, remote sensing and land information systems for instruction and research. Equipment includes total stations, electronic theodolites, electronic distance measuring devices, ordinary and precise levels, an electronic data terminal and several supporting miscellaneous equipment.

Hydraulics Laboratory

The lab is equipped with a fourteen meter flume that can be used for open channel flow & demonstration of hydraulic jump, uniform channel flow, energy / depth & depth-discharge relationships, flow over different types of control sections, supercritical and subcritical flows and water surface profiles. The lab also includes several hydraulic benches fitted with various accessories for experimentation with water flow.

Computer Facilities

The department runs a computation facility equipped with numerous IBM compatible desk-top computers as well as printers, plotters and scanners. This facility is made available to the students as well as teaching staff members and is supplied with a broad range of software packages including word processing, computer-aided drafting and design, spreadsheet, database as well as specialized technical programs for analysis and design in the various fields of civil engineering.
## CIVIL ENGINEERING DEPARTMENT PROGRAM

### DIPLOMA STAGE (83.5 UNITS)

1) Compulsory Courses (81.5 Units)

#### 1) Basic Courses: (13 Units)

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2) Engineering Courses: (54 units)

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CT 163  Soil Mechanics (2)  CT 123  2  2  -  2  
CT 157  Diploma Project  Department Approval  2  1  -  3  

3) Humanities and Language Courses: (4.5 units)

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4) Field Training: (10 units)

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II) Elective Humanities & Language Courses (2 units Required)

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# BACHELOR STAGE (83.5 Units)

## 1) Compulsory Courses (71.5 units)

### 1) Basic Courses: (5 units)

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### 2) Engineering & Technology Courses: (54 units)

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<td>Water &amp; Waste Water Treatment</td>
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### 3) Humanities & Language Courses: (2.5 units)

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### 4) Field Training: (10 units)

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### II) Elective Courses (12 units)

#### 1) Basic Courses: (5 units required)

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<td>MTH 203</td>
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<td>ENG 221</td>
<td>Modeling &amp; Simulation</td>
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#### 2) Engineering Courses: (4 units required)

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<tr>
<td>CT 254</td>
<td>Technical Report Writing</td>
<td>CT 216 &amp; LNG 201</td>
<td>2</td>
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<td>CT 301</td>
<td>Hydraulic Structures</td>
<td>CT 161</td>
<td>2</td>
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<td>CT 303</td>
<td>Coastal &amp; Harbor Eng.</td>
<td>CT 161</td>
<td>2</td>
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<td>CT 305</td>
<td>Surface &amp; Ground Water Hydrology</td>
<td>CT 262</td>
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<td>CT 307</td>
<td>Irrigation &amp; Drainage Eng.</td>
<td>CT 154</td>
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<td>Selected Topics in Water Resources</td>
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<td>Water Pollution Control Processes</td>
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CIVIL ENGINEERING COURSES DESCRIPTION

CT 104: Fluid Mechanics, 3 (3, 1, 1)

Properties of Fluids; Statics of Fluids, Equation of One Dimension, Flow over Notches and weirs, Rotary Motion of Fluids, Flow of Viscous Fluids. Surface Resistance; Introduction to the Boundary Layer Theory; Resistance in Pipes and Conduits.
PREREQUISITE: ENG 199 & MTH 002

CT 111: Properties & Testing of Materials (1), 4 (3, 1, 1)

Engineering materials: properties and testing of materials; specifications; building stones; bricks; lime; gypsum; plastering; painting; timber; testing machines; strain gauges; tension test; compression test; bending test; shear test; hardness test; impact; non destructive tests; metallic materials.

CT 112: Theory of Structures (2), 3 (2, 2, -)

PREREQUISITE: CT 153

CT 113: Building Construction, 2 (2, -, 1)

Building construction techniques; conventional methods, construction automation, Prefabrication methods. Architectural drawings & details, construction sequences of buildings, foundations, insulation, staircases, roofs, walls, paints, floorings, electrical and Plumbing services.

CT 114: Properties & Testing of Materials (2), 3 (3, -, 2)

PREREQUISITE: CT 111

CT 121: Reinforced Concrete (1), 3 (3, 1, -)

PREREQUISITE: CT 112 & CT 114 & CT 152

CT 122: Metallic Structures (1), 3 (2, 2, -)

PREREQUISITE: CT 112 & CT 152

CT 123: Soil Mechanics (1), 3 (2, 1, 1)

Soil Formation, Physical properties; Hydraulic properties and permeability, Stress Distribution; Consolidation; Shear strength; Soil Exploration and Soil Testing.
PREREQUISITE: CT 151

CT 142: Properties & Testing of Materials (3), 3 (2, 2, -)

of Carbon steels. Cast iron, copper & copper alloys, Experimental Stress Analysis.

PREREQUISITE: CT 153

CT 151: Engineering Geology, 2 (2, -, 1)
Sources and processing for both natural & synthetic aggregates needed for construction, minerals & rock types. Structural geology & influence of geological features on engineering works.

CT 152: Civil Engineering Drawing (1), 1 (-, -, 4)
Metallic Structures: Columns & Bases, Trusses, Built-up Sections, Joints. Concrete Structures: Reinforcement details.
PREREQUISITE: ENG 004

CT 153: Theory of Structures (1), 3 (2, 2, -)
PREREQUISITE: ENG 199 & MTH 002

CT 154: Irrigation & Drainage, 4 (3, -, 2)
PREREQUISITE: CT 161

CT 155: Surveying (1), 4 (3, 2, 1)
PREREQUISITE: MTH 002

CT 156: Civil Engineering Drawing (2), 1 (-, -, 4)
Civil & Irrigation structures: Earth slopes, Retaining walls, Some Civil & Irrigation Structures, Introduction to Computer aided Drafting.
PREREQUISITE: CT 152

CT 157: Diploma Project, 2 (1, -, 3)
The student selects one of several subjects offered including computer aided drafting, quantity take-off for engineering projects, etc....
PREREQUISITE: DEPARTMENT APPROVAL

CT 161: Hydraulics (1), 3 (3, 1, 1)
PREREQUISITE: CT 104

CT 163: Soil Mechanics (2), 2 (2, -, 2)
Soil Compaction: Laboratory & Field Methods, stability of slopes, Seepage through soil, Dewatering, Introduction to Foundation Engineering: Shallow Foundations, Bearing Capacity, & Settlement Analysis.
PREREQUISITE: CT 123

CT 170: Surveying (2), 3 (3, -, 3)
PREREQUISITE: CT 155

CT 191: Mechanical & Electrical Engineering, 2 (2, -, 1)
Mechanical: Engineering principles of equipment used in civil engineering work, excavation equipment, concrete mixing,
equipment for asphalt making and paving, pumps, rates of operation
and methods of control, rates of moving and handling of materials,
maintenance methods.

Electrical: Electrical Circuits for Direct and Alternating
Current. Three phase circuits, Distribution of Electric power, Electric
motors and their applications in civil Engineering. Transformers &
their use, Electronic Circuits in civil Engineering applications.
PREREQUISITE: PHY 106

CT 200: Project Management for Civil Engineering. 1 (1, -, 3)

Definition of engineering projects. Modeling of projects,
tasks and subtasks as activity, networks, Principles and practices
critical path methodology under conditions of certainty (CPM)
and uncertainty (PERT). Resource loading & cost crashing concepts
with & without resource limitations. Use of computer programs in
managing engineering projects.
PREREQUISITE: MNG 101

CT 211: Theory of Structures (3), 3 (2, 2, -)

Analysis of indeterminate structures; trusses, beams, plane
frames and arches. Axial force, shear force & bending moment
diagrams. Method of consistent deformations, prestrain & support
movement effects. Slope deflection method. Reciprocal law. Moment
distribution; sway consideration. Analysis of non-prismatic members.
PREREQUISITE: CT 112

CT 212: Theory of Structures (4), 2 (3, 2, -)

Strain due to axial force, bending moment, shear force &
torsion. Energy & complementary energy concepts. Virtual work
method; linear & nonlinear systems. Castigliano's theorem. Principle
of minimum potential energy. Differential equations of beams and
beam-columns in static and dynamic equilibrium. Finite difference
and Rayleigh-Ritz method of solution; approximate methods of
structural analysis; portal and cantilever methods; sketching of
deflected shapes. Influence lines of indeterminate structures;
trusses and beams. Introduction to Matrix Methods of Analysis.
PREREQUISITE: CT 211

CT 213: Theory of Structures (5), 2 (2, 1, 2)

Matrix Stiffness Analysis, element & structural stiffness
assembly, development of computer programs for linear elastic
structural analysis.
PREREQUISITE: CT 212 & CS 199

CT 215: Metallic Structures (2), 3 (3, 3, -)

Basic behavior of steel structures, including both the
component parts & the completed structures. Allowable stress
Design & Plastic Design concepts. Laterally supported &
unsupported Beams, Continuous Beams, Composite Design, Beam
-Column Elements, Bracing Systems, Connection Detailing &
stiffening. Structural systems include Rigid Frames, Floor Systems
& Buildings.
PREREQUISITE: CT 122 & CT 211

CT 216: Specifications, Bids & Contracts, 1 (-, 2, -)

Introduction to the legal & contractual aspects of the
construction industry. Techniques for coordinating decisions and
actions in the design & construction of engineering projects.
Bidding strategies & procedures. Different types of
PREREQUISITE: CT 113 & CT 121

CT 221: Reinforced Concrete (2), 3 (3, -, 3)

Design of floor systems, one way, two ways, ribbed, hollow
& flat slabs. Design for torsion, combined shear & torsion by the
strength method. Design of continuous beams. Moment redistribution
for minimum rotation capacity. Design of columns under axial &
eccentric loading, short & long columns, Staircases, Footings.
PREREQUISITE: CT 121

CT 222: Foundation Engineering, 4 (3, 3, -)

Types of foundation systems & design criteria, design of
shallow foundations & deep foundations, construction methods, effects
of construction on nearby structures, special topics & case studies.
PREREQUISITE: CT 163 & CT 121
CT 223: Reinforced Concrete (3), 2 (2, 2, -)

Rectangular and circular tanks & fluids containers. Underground, on the ground & elevated tanks. Design & working drawings of beams, frames, arches, trusses & saw tooth roofs.

PREREQUISITE: CT 221, CT 211

CT 224: Reinforced Concrete (4), 2 (2, 2, -)

Prestressed concrete elements: Introduction, stresses under working loads, ultimate loads & flexural strength, shear, camber & deflection, dimensioning. Tall buildings under lateral loads, lateral load resisting systems. Repair of concrete structures. Special structures.

PREREQUISITE: CT 223

CT 225: Metallic Structures (3), 2 (2, 2, -)

Fundamentals & Principles of Steel Bridges. Egyptian code. Distinctive features, analysis procedure & design of the most widely used bridge systems. Loads, Deck systems & structural systems. Structural systems include Truss Bridges, Plate Girder Bridges, Parallel Girder Systems, Stiffened Suspension Bridges & Cable Stayed Bridges. Additional topics include orthotropic plate decks, grid reinforced decks, bracing systems, structural details & elastomeric bearings.

PREREQUISITE: CT 215

CT 231: Highway & Airport Engineering, 3 (3, 2, 1)


PREREQUISITE: CT 253 & CT 123

CT 251: Inland Navigation & Harbor Engineering, 3 (3, 2, -)


PREREQUISITE: CT 161

CT 252: Civil Engineering Project, 3 (-, -, 6)

An independent research and/or design project to be carried
out under the supervision of a staff member, running over two
semesters in the fifth year. The results must be submitted in the form
of a thesis, judged & marked by a jury of at least two staff members.

PREREQUISITE: DEPARTMENT APPROVAL

CT 253: Transportation Planning & Traffic Engineering, 3 (3, 2, 2)
Principles of Transportation Planning & Traffic Engineering,
Road-User & Vehicle Characteristics. Travel Time, Speed & Volume
Studies, Highway Capacity, Pedestrian, Parking & Accident Studies,
Traffic Control Devices, Grade Separations & / or Interchanges.
PREREQUISITE: MTH 105 & CT 155

CT 254: Technical Report Writing, 2 (2, 1, -)
Study of basic organization, style & mechanics of technical
& administrative reports. Practice in assignments such as technical
descriptions, proposals, recommendations, & instruction. Emphasis
on planning, organizing, & writing reports; design of visual aids;
elements of technical editing & preparation of final drafts.
PREREQUISITE: CT 216 & LNG 201

CT 262: Hydraulics (2), 2 (2, 1, 1)
Fluid flow around immersed objects, unsteady flow in open
and closed conduits, engineering applications.
PREREQUISITE: CT 161

CT 263: Water Supply & Sewerage Systems, 3 (3, 2, -)
Quantity of water & wastewater. Design of water supply
networks including pumping stations & storage capacity. Design
of sanitary & storm sewers, including appurtenances.
PREREQUISITE: CT 262

CT 264: Irrigation Works Design (1), 2 (3, 2, -)
Canals & Drains: Classification, Synoptic Diagrams, Design
of cross & Longitudinal Sections. Culverts: Hydraulic &Structural
Design.
Small Bridges for Irrigation Works: Hydraulic & Z Structural
Design.
Intermediate & Tail Escapes.
PREREQUISITE: CT 221 & CT 154 & CT 156

CT 265: Irrigation Works Design (2), 2 (2, 2, 1)
Heading Up Structures: Overflow & Standing Wave Weirs,
Head & Partial Regulators, Barrages. Navigation Structures: Locks,
Gates, Navigation Connections. Crossing Structures: Siphons,
Aqueducts, & Tunnels. Storage Structures: Dams (Aswan Dam,
High Dam).
PREREQUISITE: CT 264

CT 271: Railway Engineering, 3 (3, 2, -)
Dynamics of Rolling, Track Alignment, Railway Branches.
Design and Details of Track Parts. Stations and Yards. Signals,
Maintenance, Renewing.
PREREQUISITE: CT 253

CT 274: Water & Wastewater Treatment, 2 (3, 2, -)
Water quality & standards. Water treatment, including
clarification, filtration, disinfection & softening. Characteristics of
wastewater. Sewage treatment, including solids removal & biological
processes.
PREREQUISITE: CT 161

CT 277: Surveying (3), 3 (3, 1, 1)
Introduction to Theory of Errors & Error Analysis of Surveying
Measurements. Coordinate Systems & Transformations. Coordinate
Computations: polar method, intersection, & resection. Modern
Methods for Distance Measurements: Electronic Distance
Measurement (EDM) & total stations. Setting out of Engineering
Projects.
PREREQUISITE: CT 170

CT 301: Hydraulic Structures, 3 (2, 1, -)
Design of inlet & outlet structures for irrigation canals. Cross

PREREQUISITE: CT 161

CT 303: Coastal & Harbor Engineering, 3 (2, 1, -)


PREREQUISITE: CT 161

CT 305: Surface & Ground-Water Hydrology, 3 (2, 1, -)


PREREQUISITE: CT 262

CT 307: Irrigation & Drainage Engineering, 3 (2, 1, -)


PREREQUISITE: CT 154

CT 309: Selected Topics in Water Resources, 3 (2, 1, -)


PREREQUISITE: TBA.

CT 311: Water Pollution Control Processes, 3 (2, 1, -)


PREREQUISITE: CT 274

CT 313: Environmental Engineering, 3 (2, 1, -)


PREREQUISITE: CT 274

CT 315: Wastewater Reclamation & Reuse, 3 (2, 1, -)

Wastewater reuse as an essential part of water resources management. Characteristics of municipal secondary effluents & quality standards for reuse. Reclaimed Wastewater use in agricultural, landscaping, recreational & industrial developments. Industrial wastes: characteristics, reclamation & recycling. Combining of treatment units to achieve the required water quality standards.

PREREQUISITE: CT 274

CT 317: Industrial Wastes, 3 (2, 1, -)

Quality & quantity of water supplies to, & Wastes from industries. Methods of treatment & disposal of industrial, wastes most common in the area.

PREREQUISITE: CT 274

CT 319: Selected Topics In Environmental Eng., 3 (2, 1, -)


PREREQUISITE: CT 274

**PREREQUISITE:** CT 212 & CS 199

**CT 351: Prestressed Concrete, 3 (2, 1, -)**


**PREREQUISITE:** CT 223

**CT 353: Advanced Reinforced Concrete, 3 (2, 1, -)**


**PREREQUISITE:** CT 223

**CT 355: Bridge Engineering, 3 (2, 1, -)**

Types and components of bridges. Loads on bridges. Fundamental behavior and practical design of shallow superstructures, with emphasis on slab-on-girder deck systems. Design of composite sections. Bridge substructures. Bridge rating. Use of relevant codes.

**PREREQUISITE:** CT 224 & CT 225

**CT 357: Quality Control of Construction Materials, 3 (2, 1, -)**


**PREREQUISITE:** MTH 105 & CT 142

**CT 359: Design of Building Systems, 3 (2, 1, -)**


**PREREQUISITE:** CT 223 & CT 215

**CT 361: Earthquake Resistant Design, 3 (2, 1, -)**

Seismicity, Code forces, distribution of shear & moments, dynamic effects, ductility; Seismic design in steel, concrete & masonry. Seismic analysis methods.

**PREREQUISITE:** CT 223 & CT 215

**CT 363: Structural Maintenance & Retrofitting, 3 (2, 1, -)**

Repair of concrete structures, causes & positions of cracks, materials used in repair, strengthening of structures & foundation, repair & strengthening of steel structures, seismic retrofitting.

**PREREQUISITE:** CT 223 & CT 215

**CT 364: Selected Topics in Concrete Design & Technology, 3 (2, 1, -)**

Design of Special Concrete Mixes, Curing Methods, Admixtures, Fiber-reinforced Concrete, Polymer Concrete. Hot & cold weather Concreting, Concrete Construction in Hot Weather with Special Reference to Middle Eastern Countries. Concrete Deterioration, Maintenance & Repairs. Precast Concrete, Concrete Production & Quality Control.

**PREREQUISITE:** CT 211 & CT 223

**CT 371: Earth Dams, 3 (2, 1, -)**


**PREREQUISITE:** CT 222

**CT 373: Geology & Site Investigation, 3 (2, 1, -)**

Geologic Information Pertinent to Civil Engineering in