

## **Construction & Building Engineering Courses (CB)**

### **CB 221 – Construction Engineering Drawing**

#### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 4 Hrs.            Credit – 3.

Prerequisite:    ME 151.

#### **COURSE DESCRIPTION**

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Introduction to construction engineering as related to the overall types of Engineering projects. A brief review of the construction industry; site layout, erection of steel and concrete structures. Drawings to demonstrate the concepts of various types of civil engineering and construction projects which include: residential and industrial buildings, water resources projects, urban transportation systems, coastal development projects, and environmental protection projects. Design and construction drawings which include architectural systems, structural systems, mechanical and electrical installation. Field strips and analysis of local construction projects..

### **CB 241 – Structural Analysis I**

#### **COURSE INFORMATION**

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Hours:            Lecture – 4 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    BA 141.

#### **COURSE DESCRIPTION**

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Definition of a structure, its support conditions and its various structural forms in addition to various loading conditions that a structure must support. Study the stability and determinacy of structures. Calculation of reaction forces. Basic concepts of structural analysis. Calculation of the internal forces (normal forces, shear forces and bending moments) and its distribution on statically determinate beams, frames and arches. Member forces in trusses. Influence lines and its use to calculate the maximum response functions in structures.

### **CB 242 – Strength of Materials**

#### **COURSE INFORMATION**

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Hours:            Lecture – 4 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 241 & CB 251.

#### **COURSE DESCRIPTION**

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Properties of Areas, Normal stresses: Axial stress, thermal stress and bending stresses. Shear stresses: Direct shear stress, Transverse loading and torsional stresses, Principal stresses and strains, Elastic deflection of beams, buckling of columns.

## **CB 251 – Testing of Materials**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    None.

### **COURSE DESCRIPTION**

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Codes and Specifications, Classification of Engineering Materials, The Architecture of Solids, Mechanical Properties of Engineering Materials, Testing materials machinery, Axial static tension: stress- strain relationship, Static compression: test, static bending, static torsion, mechanical properties and testing, Hardness of metals, Dislocations and Strengthening Mechanism in Metals, Fracture, impact testing, Fatigue, Creep.

## **CB 271 – Construction Surveying I**

### **COURSE INFORMATION**

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Hours: Lecture – 2 Hrs.    Tutorial – 2 Hrs.    Laboratory – 2 Hrs.    Credit – 3.

Prerequisite:    BA 124.

### **COURSE DESCRIPTION**

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Standards ; Unit calibration ; Measurement of distance ; Linear surveying technique ; Bearing calculation and measurement ; Compass Traversing ; Rectangular coordinates calculation ; Application of practical surveying problems ; Measurement of horizontal and vertical angles ; Theodolite Traversing ; Profile leveling ; Contouring ; Computation of earthwork ; Layout of construction engineering projects .

## **CB 281 – Hydraulics for Civil Engineers**

### **COURSE INFORMATION**

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Hours: Lecture – 2 Hrs.    Tutorial – 2 Hrs.    Laboratory – 2 Hrs.    Credit – 3.

Prerequisite:    BA 114.

### **COURSE DESCRIPTION**

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Properties of fluids and flow continuum, hydrostatics, hydrodynamic applications, flow kinematics properties and forces, flow conservation equations, continuity equation, momentum principle, energy equations, flow measurements, flow in closed/open conduits, flow in pipeline systems; pipes in series, pipes in parallel, pipeline network and pump stations, features of hydraulic analyses for the design of civil engineering projects in rivers, lakes and coastal zone.

## **CB 311 – Introduction to Construction Management**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    None.

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**COURSE DESCRIPTION**

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The nature of the construction industry, participants of the construction project, management functions, organizational structures, time value of money and interest, cash flow diagram and equivalence, measures of worth, comparison of alternatives, feasibility studies, application of economic analysis principles to the construction industry.

**CB 312 – Systems Analysis in Construction****COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    BA 329.

**COURSE DESCRIPTION**

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Introduction to the mathematical models. The formulation of linear programming models. Solving of linear programming models using the graphical solution method. The simplex method. The transportation and assignment problems. Decision making under uncertainty, risk aversion, utility function. Economic considerations for resource allocation, minimum cost model. Sensitivity analysis, changes in unit costs, changes in resource constraints.

**CB 313 – Quality Control in Construction****COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    BA 329.

**COURSE DESCRIPTION**

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Introduction to quality. Quality improvement techniques. Control charts for variables. In addition, the evaluation of strength test results of concrete, variation and analysis is presented. Quality assurance. Quality systems; ISO 9000 series. Total quality management.

**CB 322 – Building Construction****COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 4 Hrs.            Credit – 3.

Prerequisite:    CB 221.

**COURSE DESCRIPTION**

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The course covers topics in the area of building construction in view of both aspects; construction engineering and architectural engineering. The subjects related to the architectural engineering are architectural engineering drawings, brick works, insulation, stairs, building openings, services and finishing materials. The subjects related to construction engineering are site and temporary works, substructure, superstructure, health and safety.

## **CB 343 – Structural Analysis II**

### **COURSE INFORMATION**

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Hours:            Lecture – 4 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 242.

### **COURSE DESCRIPTION**

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Introduction to statically indeterminate structures, Methods of structural analysis of statically indeterminate structures. Method of consistent deformations. Method of three-moment equation for continuous beams. Virtual work method. Slope-deflection method. Moment distribution method. Stiffness method. Computer validations.

## **CB 352 – Construction Materials**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.    Tutorial – 2 Hrs.    Laboratory – 2 Hrs.    Credit – 3.

Prerequisite:    CB 251.

### **COURSE DESCRIPTION**

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Terminology and basic geology of construction materials Physical properties: Weight - Volume relationship, Sieve Analysis, Gradation curves, and Classification, Engineering properties: Strength and deformation characteristics, Aggregates in Construction, Hydraulic Cements, Properties of Cement Paste, Portland cement concrete: Basic ingredients, basic constituent, Proportioning of concrete mixtures. Concrete Strength and behavior, Concrete Durability, Admixtures in Concrete, Masonry, Asphalt concrete: proportions, Mix procedures and Engineering properties.

## **CB 354 – Design of Reinforced Concrete Structures I**

### **COURSE INFORMATION**

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Hours:            Lecture – 4 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 343.

### **COURSE DESCRIPTION**

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Introduction and material properties, Elastic Method: Analysis and design of beams considering flexure. Limit state Design Method: Analysis and Design of beams considering flexure and shear. Development length and anchorage. Design of one- way at two-way solid slabs. Analysis and design of short columns.

## **CB 361 – Engineering Geology**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    None.

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**COURSE DESCRIPTION**

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Earth composition. Major types of rocks and deposits. Clay minerals. Weathering conditions. Principles of structural geology. Subsurface exploration: techniques and tests. Influence of geological origin on composition and structure of soils. Index properties. Soil description and engineering classification. Permeability and capillarity.

**CB 382 – Water Resources Engineering****COURSE INFORMATION**

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Hours:            Lecture – 4 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 281.

**COURSE DESCRIPTION**

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Watershed hydrology and hydraulic measurements; Principles of hydrologic modeling for surface water; Introduction to ground water engineering. Design of erodible and non-erodible channels open channels; Flow characterization of lakes & reservoirs and its design engineering; Design and construction aspects of water resources structures; Dams and ancillary water supply structures; Flood-damage mitigation and stormwater control structures; Planning of water resources projects and introduction to water resources management. Field visits to water resources projects and laboratory facilities.

**CB 415 – Quantity Surveying, Cost Estimating and Specifications****COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 322.

**COURSE DESCRIPTION**

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Quantity surveying. Introduction to cost estimating in construction. Direct and indirect costs. Markups and profits. Construction bidding. Construction specification writing, types and uses.

**CB 444 – Design of Metallic Structures****COURSE INFORMATION**

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Hours:            Lecture – 4 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 343.

**COURSE DESCRIPTION**

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Introduction to metallic structures, Structural properties and allowable stresses of steels, Fields of applications of steels, Loads, Planning & Bracing of steel structures. Design of axially loaded tension and compression steel members, Design of steel beams and beam-columns, Design of steelwork connections, Steel frames, Steel bridges, Construction of steel structures.

## **CB 455 – Design of Reinforced Concrete Structures II**

### **COURSE INFORMATION**

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Hours:            Lecture – 4 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 354.

### **COURSE DESCRIPTION**

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Analysis and design of sections subjected to torsion, design of stairs, design of eccentric sections, Analysis and design of slender columns, design of frames, design of flat slabs and hollow blocks, Design of water tanks, Introduction to pre-stressed concrete.

## **CB 362 – Soil Mechanics**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.    Tutorial – 2 Hrs.    Laboratory – 2 Hrs.            Credit – 3.

Prerequisite:    CB 361.

### **COURSE DESCRIPTION**

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Seepage. Effective stress. Vertical stresses. Consolidation and settlement. Shear strength. Slope stability. Lateral earth pressure. Compaction. Bearing capacity. Experimental determination of soil properties: Grain size distribution, Atterberg limits, Density and Compaction, Permeability, Shear strength, Consolidation, Bearing Capacity, In situ Testing and Sampling. Soil report writing.

## **CB 431 – Technical Installations in Buildings**

### **COURSE INFORMATION**

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Hours:            Lecture – 4 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 322.

### **COURSE DESCRIPTION**

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Thermal Comfort, Heating, Ventilation & Air Conditioning (HVAC), Central heating & cooling systems, Distribution Media, Delivery devices, Heat and Moisture transfer in buildings, Lighting, On-site power generation, Normal electrical systems, Special systems, Water supply & Drainage systems, Types of fixtures, Private sewerage systems, Fire protection systems, Architectural acoustics.

## **CB 463 – Design and Construction of Earth Structures and Foundations**

### **COURSE INFORMATION**

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Hours:            Lecture – 4 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 462 and CB354.

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**COURSE DESCRIPTION**

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Types of foundation and selection criteria. Design of shallow and deep foundations. Construction and practical considerations. Pile-load test. Retaining structures. Sheet-pile walls. Diaphragm walls.

**CB 472 – Transportation and Traffic Engineering****COURSE INFORMATION**

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Hours:            Lecture – 4 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 271.

**COURSE DESCRIPTION**

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Transportation systems; Individual vehicle motion ; Transportation networks ; Vehicle flow ; Time – Space diagrams ; Fundamental flow relationships ; Transportation planning ; Trip generation ; Trip distribution ; Modal choice ; Network assignments ; Network equilibrium ; Classification of Highways ; Geometric design ; Horizontal alignment ; Vertical alignment ; intersections, interchanges, structural design of highway.

**CB 474 – Highway Design and Construction****COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 472.

**COURSE DESCRIPTION**

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Highway classification & process of location selections; Horizontal Alignment and details of geometric design ; Vertical alignment and details of geometric design ; Principles of traffic flow ; Highway level of service (LOS) ; Capacity of highway segments ; multi-lane and two lanes ; At grade intersection , types , Canalization ; Intersection Control and traffic Signal Design ; Interchanges, types, principles of design examples ; Soil engineering for highway design ; Bituminous Material ; traffic load transformation , Equivalent Single Axle load Concept (ESAL) ; Design of flexible Pavements , AASHTO method of design , BCBR method of design ; Highway construction ; Highway Maintenance.

**CB 483 – Irrigation and Drainage****COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 382.

**COURSE DESCRIPTION**

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Application of the hydraulic & hydrologic principles to the design and construction of irrigation and drainage systems: Crop water requirements and hydrologic determination of the design flow; traditional and modern irrigation methods and systems; Types of drainage

systems; hydraulics of surface drainage-ground water interface; Irrigation and drainage system design and structures.

## **CB 485 – Design and Construction of Coastal Structures**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 281.

### **COURSE DESCRIPTION**

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Ocean environment; wind, tides, wave mechanics; Coastal processes; surf-zone dynamics & coastal sediment transport; Wave & current forces on coastal structures; Port planning and technology; Functional design of coastal structures; Construction aspects of major coastal structures; breakwaters, seawalls, docking facilities, ocean outfalls and submarine pipelines. Field visits to local coastal protection projects.

## **CB 514 – Construction Contracts and Law**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB311.

### **COURSE DESCRIPTION**

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Principles and basics of construction contracting, Types of construction contracts, selection of construction contracts, contracts documents, project delivery systems, introduction to building and construction law, Legal aspects associated with construction projects, claims.

## **CB 516 – Construction Project Management I**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.    Tutorial – 2 Hrs. + Laboratory – 2 Hrs    Credit – 3.

Prerequisite:    CB 311.

### **COURSE DESCRIPTION**

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The project life cycle and main project processes, project administration and documentation, construction productivity, value engineering, safety and health, risk management, procurement and supply chain management, sustainable construction and strategic management concepts.

## **CB 519 – Construction Project Management II**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.    Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 417.



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**COURSE DESCRIPTION**

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Project definition and work breakdown structure. Scheduling and control models and techniques such as: AOA, AON, bar charting, line of balance, resource allocation, and time reduction. Documentation and reporting, time and cost control, progress monitoring and evaluation and computer applications.

**CB 518 – Financial Management and Accounting in Construction****COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 517

**COURSE DESCRIPTION**

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Principles of financial management and accounting. Financial statements' compilation and analysis, Source of finance, project financing, budgeting, Financial Risk, introduction to cost accounting and risk-return relationship.

**CB 523 – Methods and Equipment for Construction I****COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 322.

**COURSE DESCRIPTION**

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Design and construction of formwork systems; horizontal formwork, and vertical formwork. Concrete technology; mixing and batching concrete, transporting concrete, and placing and compacting concrete. Design and construction of dewatering systems; open sumps system, wellpoints system, and deep wells system. Design and construction of shoring systems; continuous piles system, secant piles system, and diaphragm walls system. Cranes; derrick cranes, mobile cranes, and tower cranes. Health and safety precautions.

**CB 524 – Methods and Equipment for Construction II****COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 523.

**COURSE DESCRIPTION**

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Engineering fundamentals of moving earth. Tractors and related equipment; tractors, bulldozers, clearing land, and ripping rock. Scrapers. Excavating equipment; draglines, clamshells, hydraulic excavators, loaders, and trenching machines. Trucks and wagons. Belt conveyor systems. Piles and pile-driving equipment. The production of crushed stone aggregate. Health and safety precautions.

## **CB 525 – Special Topics in Construction Engineering**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 523.

### **COURSE DESCRIPTION**

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Construction of multistory buildings; Shoring and reshoring operations. Assessment of formwork removal times. Advanced formwork systems. Slip form technique. Lift slab system. Tilt-up construction. Up-down construction technique. Precast concrete technology. Bridge construction systems; Cast-in-place system, cantilever carriage method, and flying shuttering. Tunnel construction. Compressed air. Blasting rock. Health and safety precautions.

## **CB 532 – Environmental and Sanitary Engineering**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 382.

### **COURSE DESCRIPTION**

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Sources of pollution, water quality management, waste-water treatment, industrial wastes, types and disposal, solid waste management, collection and disposal, hazardous wastes.

## **CB 533 – Environmental Control and Energy in Buildings**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 531.

### **COURSE DESCRIPTION**

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Energy expenditure in construction stages; Comparison of building material on a production energy basis; Energy demands of a building; Renewable energy and Sustainable development; Thermal load of building spaces; Effect of building envelop; Energy conscious building design; Description of some methods of energy conservation & waste-energy recovery; Alternative building demands; Environmental safety & public health considerations.

## **CB 534 – Special Topics in Environmental Engineering**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 532.

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**COURSE DESCRIPTION**

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Ecological perspective, water cycle, ecosystems, environmental regulation and legislation, Origin of environmental impact assessment, Sources of pollution, Air pollution and indoor air quality, Water quality management, Industrial wastes, Solid waste management, collection and disposal, Marine pollution, Noise pollution, Traffic noise prediction, Contribution of civil engineer in environmental control.

**CB 545 – Structural Dynamics****COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 343.

**COURSE DESCRIPTION**

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Structural vibrations, Earthquake response of structures, Design criteria for seismic resistant structures, Seismic response of tall buildings, Response spectra.

**CB 546 – Special Topics in Steel and Composite Structures****COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 444.

**COURSE DESCRIPTION**

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Design load for steel bridges according to the Egyptian code requirements, Design of steel structural elements of bridges. Construction methods for steel bridges. Design of composite structural elements, columns beams and beam- columns. Design of and Constructions of structural elements made of cold-formed steel sections.

**CB 556 – Concrete Technology****COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 352.

**COURSE DESCRIPTION**

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Concrete workability and consistency. Concrete manufacturing. Mixing, transporting and casting of concrete. Properties of hardened concrete. Compacting and curing of concrete. Expansion joints. Concrete admixtures. Concrete durability. Design of concrete mixtures. Evaluation of concrete strength. Ready mix concrete. Hot weather concrete curing.

**CB 557 – Inspection, Maintenance, and Repair of structures****COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite: CB 444 & CB455.

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**COURSE DESCRIPTION**

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Overview of maintenance, Causes and agents of deterioration, Diagnosis and investigation techniques, Diagnosis and investigation techniques, Foundations repair, concrete defects, Repair of concrete structure, Site visit for a repair project, other materials investigation and repair.

**CB 558 – Special Topics in Reinforced Concrete Structures**

**COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 455.

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**COURSE DESCRIPTION**

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This course introduces the design of concrete structures for special tasks. These structures include bridges, halls, and storage structures. The design of contemporary R.C. bridges is achieved through learning the theory and basics behind pre-stressed concrete and the design of pre-stressed bridges. In addition, the design of halls in buildings or factories is applied through the design of saw-tooth (north light) structures, shell roof structures, and arched frame structures. Moreover, the design of special structures for storage such as elevated circular tanks, ground tanks, and silos are covered in the course.

**CB 564 – Special Topics in Geotechnical Engineering**

**COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 463.

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**COURSE DESCRIPTION**

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Foundations on problematic soils. Ground modification. Soil Improvement. Mat foundation. Unsaturated soil; stress, shear strength, water flow. Geoenvironmental fundamentals. Fate and transport of contaminants in the subsurface. Treatment and disposal methods of waste. Land disposal. Site remediation and subsurface characterization. Containment.

**CB 573 – Construction Surveying II**

**COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 271.

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**COURSE DESCRIPTION**

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Types of traverses, closed, open, link, traverse nets and application, theodolite application, automatic laser level, longitudinal and grid leveling precise leveling, mass diagram and hard

distance, total staking and application, setting out construction projects, geographic information system, global positioning system, construction surveying software.

### **CB 575 – Special Topics in Transportation Engineering**

#### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 474.

#### **COURSE DESCRIPTION**

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Airport classification & site selection; Wind data analysis; Airport Configuration and main components; Determination of runway basic length & corrections; Aircraft characteristics components of airport system; Overall airport site; Classifications of Airport supporting soil; Design of Airport flexible pavements; Design of Airport Rigid Pavements; Airport lighting; Aircraft refueling, electrical power, navigation marking; Airport safe surfaces; Airport Air-traffic, Control System; Instrument landing System, Railway engineering , railway system , Railway alignment, track elements, Cross section, Platform, length, switching , signaling , Transportation Management System, Transportation Software.

### **CB 576 – Special Topics in Railway Engineering**

#### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 472

#### **COURSE DESCRIPTION**

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Railway dynamics , Tractive effort and resistances , Acceleration and braking ; Railway Alignment , Longitudinal and cross sections , Vertical and horizontal curve design ; Structural design of track , Jointed and welded rail design , Sleeper and ballast design ; Turnouts and switches , Switch , Crossover , Diamond crossing , Scissor crossover , slip , Double junction ; Stations and yards , Passenger and freight stations , Locomotive and stabling yard , Sorting and marshalling yards ; Signaling ; Train traffic management , Automatic block system (ABS) , Centralized traffic control (CTC) , Automatic control system (ATC) ; Railway capacity ; Railway cost , Price and subsidy ; Railway renewal and maintenance management.

### **CB 584 – Special Topics in Hydraulic and Coastal Structures**

#### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 483.

#### **COURSE DESCRIPTION**

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Overview of environmental design parameters related to ambient water, soil and air; Design criteria and construction aspects of major river and estuary structures which include lined open channel, river training, bridge piers, flow control structures, submerged tunnel and



## Architectural Engineering Courses (AR)

### AR 411 – Architectural Design and Urban Landscape

#### COURSE INFORMATION

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Hours:            Lecture – 2 Hrs.            Tutorial – 4 Hrs.            Credit – 3.

Prerequisite:    CB 221

#### COURSE DESCRIPTION

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This course introduces the fundamentals of architectural design and landscape architecture for non-architects students. It familiarizes students with the design process, the analysis of form and function, and the development of an architectural project. The course focuses on the role of architect and urban planner in organizing space and time to fulfill different human needs and activities. It directs students on how to deal with different design problems through systematic design process, and how to take into their considerations different physical, cultural, and temporal factors.

## Language, Humanities, & Social Science Courses (LH)

### LH 131 – English for Special Purposes I

#### COURSE INFORMATION

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Hours:            Lecture – 3 Hrs.            Credit – 2.

Prerequisite:    None.

#### COURSE DESCRIPTION

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The course aims at enhancing learners' four language skills, improving their general and technical lexical repertoire and preparing them to communicate their ideas effectively. The course is also designed to train learners to follow the principles and stages of the writing process and write academic paragraphs.

### LH 132 – English for Special Purposes II

#### COURSE INFORMATION

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Hours:            Lecture – 3 Hrs.            Credit – 2.

Prerequisite:    LH 131 - ESP I

#### COURSE DESCRIPTION

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The course aims at enabling learners to decode technical discourse in English with ease and precision. The course is also designed to enhance the learners' oral production and academic writing.





these sciences, which emerge in the mineral oil, medicate, petroleum, petrochemicals, chemical textile and other industries. This course includes topics of specialized chemical engineering technology without going through details.

### **BA 123 – Mathematics I**

#### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    None.

#### **COURSE DESCRIPTION**

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The aim of this course is the differentiation and some of its applications, basic differentiable functions of one variable. It includes definitions and intuitive meanings of derivatives; Higher derivatives; Basic techniques of differentiation; Chain Rule; Parametric equations; Partial differentiation; Implicit differentiation; Inverse function theorem; Logarithmic differentiation; differentiation; Logarithmic functions; Exponential functions; Trigonometric functions; Inverse trigonometric functions; Hyperbolic functions; Differentiation of those; Physical and geometric applications of differentiation; Limits;  $N^{\text{th}}$  derivative; L'Hôpital rule; Maclaurin's expansion as approximations of functions; Analytic geometry; Translation of Axes; Conic sections.

### **BA 124 – Mathematics II**

#### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    BA123 - Mathematics (1)

#### **COURSE DESCRIPTION**

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This course addresses integration and some of its geometric applications, as well as elementary matrix algebra. It includes definitions and intuitive meanings of indefinite and definite integrals; Fundamental Theorem of Calculus; Basic techniques of integration; Integration by parts; Geometric applications; Integration of powers of trigonometric functions; Substitution; Miscellaneous and Trigonometric substitutions; Integration of rational functions in  $x$  through partial fractions; Numerical Integration. Gauss' method for the solution of linear equations; Matrix inversion and its use in the solution of linear equations.

### **BA 223 – Mathematics III**

#### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    BA124 – Mathematics (2).

#### **COURSE DESCRIPTION**

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Solving first order differential equations: Separable of variables, Homogeneous equation, Exact equation, Linear equation and Bernoulli's equation. Solving second order

homogeneous and non-homogeneous differential equations with constant and variable coefficients. Undetermined coefficients and variation of parameters methods. Laplace transformations, basic properties, first shifting theorem, unit step function, second shifting theorem, transform of derivatives and integrals, and inverse Laplace transforms. Solving differential equations by using Laplace transform. Fourier series: Fourier series for even, odd, and harmonic functions.

## **BA 224 – Mathematics IV**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    BA 223 – Mathematics (3)

### **COURSE DESCRIPTION**

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This course gives a comprehensive study on the 2D and 3D vectors : algebra, differential and integral calculus , and the physical interpretation of the integral theorems. The course also gives a study on the complex functions, its differentiation and integration, the residue theorems and its application to real integrals.

## **BA 329 – Probability and Statistics**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    BA 124 – Mathematics (2).

### **COURSE DESCRIPTION**

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Elementary probability – Conditional probability - Independent and dependent events – Bayes Theorem - Combinatorial analysis - Discrete probability distribution – density function- Continuous probability distribution – density function - Mathematical expectation, mean and variance - Moments skewness kurtosis and moments generating function - Special discrete distribution Bernoulli - Geometric and Poisson distributions - Special continuous distribution : Uniform – negative exponential - Normal distribution- Failure – time distributions - The exponential model in reliability- The exponential model in life testing - General worked Examples.

## **BA 141 – Engineering Mechanics I**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    None.

### **COURSE DESCRIPTION**

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Introduction to mechanics. Plane and space force analysis, projection and synthesis. Moments. Couples and wrenches. Static equilibrium. Technique of free body diagrams. Applications of static equilibrium of machines, Method of virtual work and its application to solution of problems of static equilibrium.







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**COURSE DESCRIPTION**

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This course identifies the different types of industries, production techniques, management and organization structure, the different types of hazards and dangers and how to prevent them. Also, it clarifies the meaning of production planning and control and cost calculations.

**IM 112 – Manufacturing Technology****COURSE INFORMATION**

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Hours:            Lecture – 1 Hr.            Laboratory – 2 Hrs.            Credit – 2.

Prerequisite:    None.

**COURSE DESCRIPTION**

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The course provides an introduction to engineering materials and their properties, production of common metals. It covers types of manufacturing, basic manufacturing processes such as casting, metal forming, welding and machining. An overview of some advanced manufacturing processes is also included. In addition, it introduces measurement standards, instruments, deviations and methods.

**IM 535 – International Operations Management****COURSE INFORMATION**

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Hours:            Lecture – 3Hrs.            Tutorial – 0 Hrs.            Credit – 3.

Prerequisite:    126 Credit Hours.

**COURSE DESCRIPTION**

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The course introduces the students to the concepts of international business environment, international trade and direct foreign investments, foreign exchange, and economic cooperation.

**IM 531E – Human Resource Management****COURSE INFORMATION**

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Hours:            Lecture – 3 Hrs.            Tutorial – 0 Hrs            Credit – 3.

Prerequisite:    126 Credit Hours.

**COURSE DESCRIPTION**

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The course covers topics related to: Managers and their personnel concepts, personnel administration and resource policies, organizational planning and management development, managing and working in a changing world. It also includes the concepts of motivation and teamwork, recruitment and selection, training and appraisal, worker participation in production problems, wages, incentives and services.

## **Mechanical Engineering Courses (ME)**

### **ME151 - Engineering Drawing and Projection**

#### **COURSE INFORMATION:**

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Hours:           Lecture – 2Hrs   Tutorial – 2Hrs           Credit – 2

Prerequisites:   None

#### **COURSE DESCRIPTION:**

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Drawing practices and techniques – Geometrical constructions – Dimensioning and free hand sketching – Methods of projection – Orthogonal projection – Sectioning and conventions – Intersection of geometrical surfaces and development – Standard metal sections and metal structures – Pictorial projection (Isometry) – Surface intersections – Perspective projection – An introduction to Computer Aided Drafting using AutoCAD.

## **Construction & Building Engineering Courses (CB) Offered to Other Departments**

### **CB 240 – Theory of Structures**

#### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    BA 141.

#### **COURSE DESCRIPTION**

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Basic concept of structural analysis, types of structures, loads, supports and reactions. Free-body diagram, Equations of equilibrium. Analysis of statically determinate structures, internal force diagrams in beams, frames and trusses. Properties of areas, Normal stress distribution, Shear stress distribution. Elastic deflections of structure.

### **CB 350 – Building Materials & Testing**

#### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 240.

#### **COURSE DESCRIPTION**

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Introduction to elastic load-deformation behavior of materials, Stress-strain relations of building materials, aggregates physical properties, Aggregates in Construction, Cement and its types and properties, Properties of cement paste, Portland Cement Concrete: Basic ingredients, fresh concrete properties, Proportioning, Properties and strength of concrete mixtures, Lime and Gypsum, timber, Masonry, Glass and Plastics, Insulating Materials.

### **CB 351 – Reinforced Concrete and Metallic Structures**

#### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 350.

#### **COURSE DESCRIPTION**

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Planning and selection of R.C. structural systems, Planning and selection of steel structural systems, Analysis and design of R.C sections, Design of R.C. one-way slabs, Design of R.C. two- way slabs, Design of R.C. beams, Design of R.C. columns, General arrangement and bracing of steel structures, Design of steel beams, Design of steel tension members, Design of steel compression members, Design of steel columns and supports, Steel bolted connections, Steel welded connections, Selection of construction material and main systems of structures.



## **CB 370 – Surveying**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    BA 124.

### **COURSE DESCRIPTION**

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Standards; Unit calibration; Measurement of distance; Linear surveying technique; Bearing calculation and measurement; Compass Traversing; Rectangular coordinates calculation; Application of practical surveying problems; Measurement of horizontal and vertical angles; Theodolite Traversing; Profile leveling; Contouring; Computation of earthwork; Layout of construction engineering projects.

## **CB 460 – Soil Mechanics and Foundations**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    CB 351.

### **COURSE DESCRIPTION**

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Soil formation and identification. Physical and mechanical properties of soils. Soil description and classification. Exploration, sampling and in situ soil measurements. Soil report. Bearing capacity of soils. Shallow and deep foundations. Improving site soils for foundation use. Earth slopes and retaining structures. Seepage and dewatering. Impact of geotechnical considerations on architectural design and landscaping.

## **CB 510 – Project Management & Scheduling**

### **COURSE INFORMATION**

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Hours:            Lecture – 2 Hrs.            Tutorial – 2 Hrs.            Credit – 3.

Prerequisite:    AR 444.

### **COURSE DESCRIPTION**

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Introduction to construction management, relationship and responsibilities of project participants, project life cycle and management functions. Introduction to the principles of time analysis and scheduling practices in the project planning and control process, including network planning, CPM scheduling, resource leveling, cash flow analysis, project life cycle, design construction interface, and computer program applications. The course is organized around a series of exercises geared to simulate the management of the various stages of an architectural project.