Course Prerequisites

The course prerequisites are listed in the table below by each semester.

Prerequisites List – Core Courses

Course		Prerequisite		
SEMESTER 1				**YEAR 1**
BA113	Physics 1	**None**		
IM111	Industrial Relations	**None**		
BA123	Mathematics 1	**None**		
BA141	Engineering Mechanics 1	**None**		
CC111	Introduction to Computers	**None**		
ME151	Engineering Drawing & Projection	**None**		
LH131	English 1	**None**		
SEMESTER 2				
BA118	Chemistry	**None**		
BA 114	Physics 2	**BA113**	Physics 1	
BA 124	Mathematics 2	**BA123**	Mathematics 1	
BA 142	Engineering Mechanics 2	**BA141**	Engineering Mechanics 1	
CC 114	Introduction to Programming	**CC111**	Introduction to computer	
IM 112	Manufacturing Technology	**None**		
LH 132	English for Special Purposes 2	**LH 131**	English for Special Purposes 1	

Course		Prerequisite		
SEMESTER 3				
EE238	Electrical Engineering Fundamentals	**BA124**	Mathematics 2	
BA223	Mathematics (3)	**BA124**	Mathematics 2	
LH231	Technical Report Writing	**LH 132**	English for Special Purposes 2	
CB221	Construction Engineering Drawings	**ME151**	Engineering Drawing & Projection	
CB241	Structural Analysis 1	**BA141**	Engineering Mechanics 1	
CB251	Testing of Materials	**None**		
SEMESTER 4				
	College Elective (1)		As Designated Below	
BA224	Mathematics (4)	**BA223**	Mathematics (3)	
EE218	Measurements & Instrumentation	**EE238**	Electrical Engineering Fundamentals	
CB242	Strength of Materials	**CB241** **CB251**	Structural Analysis 1 Testing of Materials	
CB271	Construction Surveying 1	**BA124**	Mathematics 2	
CB281	Hydraulics for Civil Engineers	**BA114**	Physics 2	**YEAR 2**
SEMESTER 5				
BA329	Probability & Statistics	**BA224**	Mathematics (4)	
CB343	Structural Analysis 2	**CB242**	Strength of Materials	
CB352	Construction Materials	**CB251**	Testing of Materials	
CB361	Engineering Geology	**None**		
CB382	Water Resources Engineering	**CB281**	Hydraulics for Civil Engineers	
CB326	Building Information Modelling (BIM)	**CB221**	Construction Engineering Drawings	
SEMESTER 6				
CB311	Introduction to construction management	**BA224**	Mathematics 4	
CB312	Systems Analysis for Construction Engineers	**BA329**	Probability & Statistics	
CB322	Building Construction	**CB 326**	Building Information Modelling (BIM)	
CB354	Design of RC Structures 1	**CB343**	Structural Analysis 2	
CB313	Quality Control in Construction	**BA329**	Probability & Statistics	
CB362	Soil Mechanics	**CB361**	Engineering Geology	**YEAR 3**

Course		Prerequisite		
SEMESTER 7				
CC 413	Numerical analysis	**CC 114** **BA 224**	Introduction to programming Mathematics 4	
	College Elective (2)		As Designated Below	
CB455	Design of RC Structures 2	**CB354** **CB 326**	Design of RC Structures 1 Building Information Modelling (BIM)	
AR411	Architectural Design & Urban Landscape	**CB221**	Construction Engineering Drawings	
CB472	Transportation and Traffic Engineering	**CB271**	Construction Surveying 1	
CB483	Irrigation & Drainage	**CB382**	Water Resources Engineering	
SEMESTER 8				**YEAR 4**
CB415	Quantity Surveying, Cost Estimating & Specifications	**CB322** **CB 354**	Building Construction Design of RC structures 1	
CB485	Design & Construction of Coastal Structures	**CB281**	Hydraulics for Civil Engineers	
CB444	Design of Metallic Structures	**CB343** **CB 326**	Structural Analysis 2 Building Information Modelling (BIM)	
CB463	Design & Construction of Earth Structures & Foundations	**CB362** **CB 354**	Soil Mechanics Design of RC Structures 1	
CB431	Technical Installations in Buildings	**CB322**	Building Construction	
CB474	Highway Design & Construction	**CB472**	Transportation and Traffic Engineering	
IM 400	Practical Training	**None**		
SEMESTER 9				
CB501	Project 1	**132 hours + G.P.A 2.0**		
CB516	Construction Project Management 1	**CB311** **CB322**	Introduction to Construction Management Building construction	
CB514	Construction Contracts & Law	**CB311** **CB 415**	Construction Management Quantity Surveying, Cost Estimating & Specifications	
CB523	Methods & Equipment in Construction 1	**CB322**	Building Construction	
CB532	Environmental & Sanitary Engineering	**CB382**	Water Resources Engineering	
CB5XX	Engineering Elective Course 1	**Varies**		
SEMESTER 10				
CB503	Project 2	**CB501**	Project 1	
CB519	Construction Project Management 2	**CB516**	Construction Project Management 1	
CB524	Methods & Equipment in Construction 2	**CB523**	Methods & Equipment in Construction 1	
CB533	Environmental Control & Energy in Buildings	**CB431**	Technical Installations in Buildings	
CB5XX	Engineering Elective Course 2	**Varies**	As Designated Below	**YEAR 5**

Prerequisites List – Elective Courses

Course		Prerequisite	
College Electives			
NE264	Scientific Thinking	**None**	
NE266	Creativity & Innovation	**None**	
NE465	Aesthetic Education & Art Appreciation	**None**	
NE466	Environmental science & technology	**None**	
IM531E	Human Resource Management	**126 Cr. Hr.**	
IM539	International Business Management	**None**	
Department Restricted Electives			
CB 518	Financial Management & Accounting in const.	**CB516**	Construction Project Management 2
CB557	Inspection, Maintenance & Repair	**CB444 Or CB455**	Design of Metallic Structures or Design of RC Structures 2
CB 525	Special Topics in Construction Engineering	**CB523**	Methods & Equipment in Construction 1
CB 534	Special Topics in Environmental Engineering	**CB532**	Environmental & Sanitary Engineering
CB 545	Structural Dynamics	**CB343**	Structural Analysis 2
CB 546	Special topics in Steel & Composite structures	**CB444**	Design of Metallic Structures
CB 556	Concrete Technology	**CB352**	Construction Materials
CB 558	Special topics in Reinforced Concrete structures	**CB455**	Design of RC Structures 2
CB 564	Special Topics in Geotechnical Engineering	**CB463**	Design & Construction of Earth Structures & Foundations
CB 573	Construction Surveying 2	**CB271**	Construction Surveying 1
CB 575	Special Topics in Transportation Engineering	**CB574**	Highway Design & Construction
CB 576	Special Topics in Railway Engineering	**CB472**	Transportation and Traffic Engineering
CB 584	Special Topics in Hydraulic & Coastal Structures	**CB483**	Irrigation & Drainage

Chapter

3

Courses Summary Description

Brief description of all courses including the number of credit hours and prerequisites.

Architectural Engineering (AR)

AR 411 - Architectural Design & Urban Landscape
Cr.3. Prerequisites: CB 326

This course is an introduction to the fundamentals of architectural design and landscape architecture for non-architectural 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 the architect and urban planner in organizing space to fulfil different human needs and activities. It directs students with how to deal with different design problems through systematic design process, how to take into consideration different physical, cultural, and temporal factors. The course also helps the students to apply BIM on the architectural design to achieve an integrated design process. The course also introduces the landscape design process as one of the duties of the architect.

Basic and Applied Science (BA)

BA 113 – Physics (1)
Cr.3. Prerequisite: None

Electrostatics + Coulomb's law- Electric field – Motion of charged particles in a uniform electric field– Electric flux and Gauss law –Electric Potential energy and electric potential – *Cap*acitors(parallel plate capacitors, energy stored) – Capacitors in series and parallel–Electric current –Ohm's law – resistivity – Power in the circuits –Resistors in series and parallel – Kirchhoff's rules – R.C circuit –Magnetism (Force on a charge in magnetic field) Force on a current –carrying conductor in magnetic field. Biotsavart law and its application – Ampere's law and its applications – Electromagnetic Induction –Magnetic flux –Faraday's law- Mutual Induction – Self Induction – Interference of light – Young's double slit experiment – Polarization of light waves

BA 114 – Physics (2)
Cr.3. Prerequisite: BA113

Heat and work –The states of the working fluid –Reversibility and Reversible work –The first law of thermodynamics – The non-flow energy equation– The working fluid; Liquid, vapor and gas – Properties of steam – The use of steam tables. The Perfect Gas & its properties – Reversible non-flow processes: Constant volume, constant pressure, constant temperature (isothermal), adiabatic and polytrophic process for steam and perfect gas – The second law of thermodynamics – The heat

engine – Entropy –The T-S diagram a: For vapor; for perfect gas –Static and dynamic properties of fluids. Kinematics of fluid flow. Equation of continuity – The steady-flow energy equation) – Bernoulli's equation – Heat Transfer – Conduction, Convection and radiation; the composite wall and the electrical analogy; Heat flow through a cylinder and a sphere.

BA 118 - Chemistry
Cr.2. Prerequisite: None

Introduction – Electrochemical Reactions, Electro chemical cells, Introduction, Electrochemical Reactions, Electro chemical cells, Electrochemical Series, Polarization, Passivity, Definition of Corrosion, Metals and Corrosive Environments, Forms of corrosion, uniform, Galvanic and D.A.C., Pitting corrosion , S.C.C and I.G.C., Atmospheric Corrosion Erosion Corrosion, Coating protection and Inhibitors, Cathodic Protection, Classification of Fuel, Properties of liquid fuel, Combustion of fuel, Purpose of Lubrication, Classification of Lubricants, Properties of Lubricating Oils, choice of Lubricant, Additives, Introduction to Impurities in Water, Purification and Treatment of Water.

BA 123 – Mathematics (1)
Cr.3. Prerequisite: None

Basic rules of Differentiation–Trigonometric functions and their derivatives –Inverse trigonometric functions and their derivatives – Logarithmic function and its derivative. Logarithmic function and its derivative – Derivatives of hyperbolic and inverse hyperbolic functions – Parametric differentiation, Implicit differentiation –Limits and L'Hospital rule –Partial Differentiation – Taylor's and Maclaurin's expansions – Curve sketching: Critical, maximum, minimum and inflection points – Curve sketching (rational functions) and physical application (velocity and acceleration) –Conic sections : Parabola, Ellipse and Hyperbola.

BA 124 – Mathematics (2)
Cr.3. Prerequisite: BA123

Integration by parts –Integration of rational functions – Integration of Trigonometric powers – Integration by trigonometric substitution –Integration of quadratic forms and the Reduction formulas –Areas and Volumes –Length of the curve –Average of a function –Numerical integration – Matrix Algebra –Eigenvalues and Eigenvectors –Cayley – Hamilton theorem.

BA 223 – Mathematics (3)
Cr.3. Prerequisite: BA124

First order ordinary differential equations (Separable, Homogeneous, Exact, Linear and Bernoulli's equations) –Second order ordinary differential equations with constant coefficients (General solution of homogeneous and Non-homogeneous equations: Method of undetermined coefficients– The Method of variation of parameters)–Second order ordinary differential equations with variable coefficients:[Cauchy- Euler Equation] – Laplace transforms(First Shifting Theorem – Derivatives of Transforms – Transform Integration – Unit Step Function – Second Shifting Theorem – Convolution Theorem) – Inverse Laplace Transforms – Applications(Solution of ODEs using Laplace Transforms – Solution of integral equation (Volterra Integral Eq.) using Laplace Transforms–Solution of R-L circuit using the Laplace Transforms)–Fourier series of functions of period 2P, Fourier series for even and odd functions, half range expansions and for harmonic functions.

BA 224 – Mathematics (4)
Cr.3. Prerequisite: BA223

Vectors in 2D and 3D Space –Vector Algebra– Vector and scalar functions – Vector differential calculus – Vector integral calculus –Theorems, physical interpretation of the integrals theorems – Complex algebra – Complex functions – Complex differentiation – Complex integration – Poles and zeros of analytical functions – Residue theorem, and application to real integrals.

BA 329 – Probability and Statistics
Cr.3. Prerequisite: BA224

Descriptive statistics - Sample spaces and events, probability theorems - conditional probability and independence - Total probability and Bayes Theorem. – Discrete probability distribution – Continuous probability distribution – Mathematical Expectation, moments, variance and mean – special discrete distributions : Bernoulli, Binomial, Negative Binomial, Geometric, and Poisson – special continuous distributions: Uniform, exponential and Normal - discrete joint probability distributions: marginal distributions, conditional distributions, covariance , correlation coefficient - Continuous joint probability distributions: marginal distributions, conditional distributions, covariance , correlation coefficient.

BA 141 – Engineering Mechanics (1)
Cr.3. Prerequisite: None

Introduction to mechanics: general principles. Force system: rectangular components of a force, parallelogram law. Equilibrium of a particle: springs and cables. Force system resultant: moment of a force, Trans ability of a force, free body diagram. Equilibrium of a rigid body: condition of rigid body equilibrium, equation of equilibrium, two and three force member. Structural analysis: simple trusses, the method of joint, zero force members, method of sections, frames and machines. Friction and Moment of inertia.

BA 142 – Engineering Mechanics (1)
Cr.3. Prerequisite: BA 141

Kinematics of particles –Rectilinear kinematics – General curvilinear motion – Motion of projectile – Kinetics of a particle– Newton's laws of motion– equations of motion –Work and energy of a particle – Principle of work and energy – Work and energy for a system of particles – Motion of a rigid body – translational and rotational motion – General plane motion – Relative motion analysis – Relative motion analysis using rotating axis – Kinetics of a rigid body – Rotation about a fixed axis: translation, general plane motion.

Construction and Building Engineering (CB)

CB 221- Construction Engineering Drawings
Cr.3. Prerequisites: ME151

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 1
Cr.3. Prerequisites: BA141

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
Cr.3. Prerequisites: CB 241 & CB 251

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
Cr.3. Prerequisites: None

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 1
Cr.3. Prerequisites: BA 124

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 levelling - Contouring - Computation of earthwork - Layout of construction engineering projects .

CB 281 - Hydraulics for Civil Engineers
Cr.3. Prerequisites: BA 114

Properties of fluids and flow continuum – hydrostatics - hydrodynamic applications - flow kinematic 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
Cr.3. Prerequisites: BA224

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 for Construction Engineers
Cr.3. Prerequisites: BA 329

A comprehensive introduction to probability, as a language and set of tools for understanding statistics, science, risk, and randomness. Basics: sample spaces and events, conditional probability, and Bayes Theorem. Univariate distributions: density functions, expectation and variance, Normal, Binomial, Negative Binomial, Poisson, exponential distributions. Bivariate distributions.

CB 326 – Building Information Modelling
Cr.3. Prerequisites: CB 221

Introduction to Building Information Modelling (BIM) and its applications in construction. Starting and developing of a BIM. Creating basic building and structural components. Viewing and presenting the model. Detailing, drafting and clash detection. Massing studies. Creating documentation standards. Creating Bill of Quantities (BOQ) and schedules. Templates and file management. Project collaboration and work-sharing. Working with families.

CB 322 - Building Construction
Cr.3. Prerequisites: CB 326

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, and superstructure. The course also applies Building Information Modeling (BIM) to building construction.

CB 343 - Structural Analysis 2
Cr.3. Prerequisites: CB 242

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
Cr.3. Prerequisites: CB 251

Terminology and basic geology of construction materials Physical properties (Weight , Volume relationship, Sieve Analysis, Graduation 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 behaviour - Concrete Durability - Admixtures in Concrete – Masonry - Asphalt concrete (proportions, Mix procedures and Engineering properties).

CB 354 - Design of Reinforced Concrete Structures 1
Cr.3. Prerequisites: CB 343

Introduction and material properties - Elastic Method - Analysis and design of beams considering flexure - Limit slate 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
Cr.3. Prerequisites: None

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
Cr.3. Prerequisites: CB 281

Watershed hydrology and hydraulic measurements - Principles of hydrologic modelling 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 storm water control structures - Planning of water resources projects and introduction to water resources management - Field visits to water resources projects and laboratory facilities.

CB 313 - Quality Control in Construction
Cr.3. Prerequisites: BA 329

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 514 - Construction Contracts and Law
Cr.3. Prerequisites: CB311& CB415

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 and change orders, Alternative Dispute Resolution.

CB 415 - Quantity Surveying, Cost Estimating and Specifications
Cr.3. Prerequisites: CB 322& CB 354

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

CB 516 – Construction Project Management 1
Cr.3. Prerequisites: CB 311& CB322

Network Diagramming Methods. Advanced activity relationships. Bar Charts and Calendars. Work Breakdown Structures (WBS). Activity duration estimation. Project scheduling process. Resource management techniques: resource loading; resource planning & control; resource levelling; and resource allocation. Project cash flow analysis and improvement. Project progress measurement and schedule updating. Project control and Earned Value Analysis. Types of construction schedules and practical scheduling issues.

CB 444 - Design of Metallic Structures
Cr.3. Prerequisites: CB 343&CB 326

Introduction to metallic structures - Structural proprieties 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 and BIM and computer application in steel construction/detailing.

CB 455 - Design of Reinforced Concrete Structures 2
Cr.3. Prerequisites: CB 354 & CB 326

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, Applications of BIM in Reinforced Concrete structures, and Introduction to pre-stressed concrete.

CB 362 - Soil Mechanics
Cr.3. Prerequisites: CB 361

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 463 - Design and Construction of Earth Structures and Foundations
Cr.3. Prerequisites: CB 362& CB354

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
Cr.3. Prerequisites: CB 271

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 483 - Irrigation and Drainage
Cr.3. Prerequisites: CB 382

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 519 – Construction Project Management 2
Cr.3. Prerequisites: CB 516 & CB 415

Feasibility studies and economic evaluation of public projects. Value Engineering. Building Information Modelling (BIM). Probabilistic Scheduling (Pert). Cost-Time relation and schedule compression. Line of Balance. Delay Analysis Methods. Health & safety management systems. Risk Management. Sustainable construction. Advanced topics in construction project management

CB 518 - Financial Management and Accounting in Construction
Cr.3. Prerequisites: CB 516

Principles of financial management and accounting - Financial statements' compilation and analysis - projecting cash flow - project financing – budgeting - cost control - introduction to cost accounting and risk-return relationship.

CB 523 - Methods and Equipment for Construction 1
Cr.3. Prerequisites: CB 322

Design and construction of formwork systems - horizontal formwork - vertical formwork - Concrete technology - mixing and batching concrete - transporting concrete - placing and compacting concrete. Design and construction of dewatering systems - open sumps system – well points system - deep wells system - Design and construction of shoring systems - continuous piles system - secant piles system - diaphragm walls system – Cranes: derrick cranes - mobile cranes - tower cranes.

CB 524 - Methods and Equipment for Construction 2
Cr.3. Prerequisites: CB 523

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

CB 525 - Special Topics in Construction Engineering
Cr.3. Prerequisites: CB 523

Construction of multi-storey 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 - flying shuttering - Tunnel construction - Compressed air - Blasting rock.

CB 431 - Technical Installations in Buildings
Cr.3. Prerequisites: CB 322

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. Computer applications in Mechanical, Electrical, and Plumbing (MEP) works including Building Information Modelling.

CB 532 - Environmental & Sanitary Engineering
Cr.3. Prerequisites: CB 382

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
Cr.3. Prerequisites: CB 431

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
Cr.3. Prerequisites: CB 532

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
Cr.3. Prerequisites: CB 343

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
Cr.3. Prerequisites: CB 444

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
Cr.3. Prerequisites: CB 352

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
Cr.3. Prerequisites: CB 444 or CB 455

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
Cr.3. Prerequisites: CB 455

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 restressed 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
Cr.3. Prerequisites: CB 463

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 2
Cr.3. Prerequisites: CB 271

Types of traverses, closed, open, link, traverse nets and application - Theodolite application, automatic laser level - Longitudinal and grid levelling precise levelling - Mass diagram and hard distance, total stating and application - Setting out construction projects - Geographic information system - Global positioning system - Construction surveying software.

CB 474 - Highway Design and Construction
Cr.3. Prerequisites: CB 472

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 - Channelization - 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 575 - Special Topics in Transportation Engineering
Cr.3. Prerequisites: CB 574

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 refuelling, 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 , signalling - Transportation Management System - Transportation Software.

CB 576 - Special Topics in Railway Engineering
Cr.3. Prerequisites: CB 472

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 ; Signalling ; 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 & Coastal Structures
Cr.3. Prerequisites: CB 483

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 storm surge barriers - Design criteria and construction methods of some selected coastal structures are presented which embrace pile-supported structures, bulkheads & quay walls, breakwaters and submarine pipelines.

CB 485 - Design and Construction of Coastal Structures
Cr.3. Prerequisites: CB 281

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 501 - Project 1
Cr.3. Prerequisites: None

Selection of Project discipline - Assignment of Project discipline - Lecture in advanced topics - Term Project - Group presentation.

CB 503 - Project 2
Cr.6. Prerequisites: CB 501

Evaluation of students will follow college requirements - Action plan preparation - Project preparation, Final review - Project binding - Project submittal

Construction and Building Engineering (CB) Offered to Other Departments

CB 240 - Theory of Structures
Cr.3. Prerequisites: BA141

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
Cr.3. Prerequisites: CB 240

Introduction to elastic load-deformation behaviour 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
Cr.3. Prerequisites: CB 350

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
Cr.3. Prerequisites: BA 124

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 levelling - Contouring - Computation of earthwork - Layout of construction engineering projects .

CB 460 - Soil Mechanics and Foundations
Cr.3. Prerequisites: CB 351

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
Cr.3. Prerequisites: AR 444

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 levelling - cash flow analysis - project life cycle - design construction interface - 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.

Computer Engineering (CC)

CC 111 - Introduction to Computer Science
Cr.3. Prerequisites: None

This course provides an introduction to computers and computing .Topics of interest include the impact of computers on society, ethical issues, and hardware /software applications, including internet applications, system unit, storage and input/output devices, numbering systems, system and application software, presentation skills, program development, programming languages, and flow charts, Visual Basic, web page design using HTML, and communications and networks.

CC 114 – Introduction to programming
Cr.3. Prerequisite: CC 111

Introduction to Programming and Problem Solving- Variables- Memory Concepts-Assignment Statements-Arithmetic Operations-Logical Operations-Conditional Statements-Selection Control Structures-Multiple-Selection Statement-Loops-One-Dimensional Arrays-Two-Dimensional Arrays-Control events in windows applications-Functions and Procedures.

CC 413 Numerical Analysis
Cr.3. Prerequisite: CC114 & BA224

Introduction to numerical methods and their applications - Solving Equations (Bisection method and Secant method, False Position method, Successive Approximation method, Modified Successive Approximation method, Newton Raphson method and Berge Vieta method), error analysis (Definition of error, Source of errors, Types of errors, Error Propagation, and Process Graph), solving system of linear algebraic equations, numerical differentiation & integration, Interpolation (Mid-point, Trapezoidal, Simpson, and Linear and Quadratic).

Electrical Engineering (EE)

EE 238 - Electrical Engineering Fundamentals
Cr.3. Prerequisites: BA 124

Introduction to Basic Circuit: Resistance, Voltage, Current and Ohm's law - Resistance in series and Kirchhoff's voltage law, Potential divider - Resistance in parallel and Kirchhoff's current law, current divider.- Nodal Analysis - Mesh analysis - Source Transformations, superposition. - Alternating current, waves, effective and mean values - .Analysis of RL and RC circuits. - Analysis of series RLC circuits. Resonance in series circuits.AC power - Analysis of three-phase circuit - Analysis of three-phase circuits and Measurement of power and power factor in three-phase systems. - Laws of

magnetic fields, Field strength flux density, permeability, M.M.F and relations - .Magnetic circuits - .Lifting Power of electromagnets & applications.

EE 218 – Instrumentation Measurements
Cr.3. Prerequisite: EE238

Introduction to feedback control (1) - Introduction to feedback control (2)- Physical Measurements - Introduction to feedback systems - Liquid level instruments - Liquid flow instruments – PH + Viscosity - Displacement + velocity measurements - Force and torque measurements - Data analysis - Error detectors/comparators - Electric/pneumatic transducers - Amplifier – Actuation.

Industrial and Systems Engineering (IM)

IM 111 – Industrial Relations
Cr.2. Prerequisite: None

Types of industries and production techniques – Management and organization structure – Production planning and control – Industrial cost estimation techniques – Industrial economy and breakeven analysis – Accidents at work – rules and regulations – Hazards classification, prevention, and personal safety – Fire hazards identification and prevention – Chemical hazards and prevention – accident reporting – Quality control– Science, engineering, and technology.

IM 112 – Manufacturing Technology
Cr.2. Prerequisite: None

Forming operations – Heat treatment operations – Cutting tools – Mechanics of metal cutting and turning operations – Cutting fluids – Sand casting – Centrifugal casting, die casting and aspects of the casting process – casting defects -Gas and Electric arc welding – Electric resistance and pressure welding and aspects of the welding process-welding defects – Standards of measurements – Measuring Instruments – Measuring methods.

IM 535 – International Operations Management
Cr.3. Prerequisite: 126 Credit Hours.

International business environment – Cultural and legal environment – Political environment – Economic environment facing business – International trade theories – Governmental influence on trade – Regional economic integration – Factor mobility and foreign direct investment – The foreign exchange market – The determination of exchange rates – Global manufacturing and supply chain management.

IM 531E – Human Resource Management
Cr.3. Prerequisite: 126 Credit Hours.

Human resources management – The environment of human resource management – Job analysis and human resource planning – Recruitment – Internet recruitment – Selection – Training and development – Career planning and development – Performance appraisal – Compensation and benefits – Safe and health work environment – Labour management relations – Internal employee relations.

Language, Humanities and Social Science (LH)

LH 131 - ESP I
Cr.2. Prerequisite: None

Orientation - Personal Computing - Portable Computers - The process of academic writing- An overview of paragraph writing- Suffixes - Programming and Languages - Graded workshop- Unity and Coherence- Writing workshop- Computer Software - Computer Networks - Graded workshop- Computer Viruses- Computers in the Office.

LH 132 - ESP II
Cr.2. Prerequisite: LH 131

Orientation - Computers in Education - Paragraph writing (Concrete Support I) - Computers in Medicine - Essay writing (Analysis) - Graded workshop - Robotics - Summary writing - Virtual Reality - Machine Translation - Graded workshop - CVs & letters of application - Interviewing skills - Multimedia.

LH 231 - Technical Report Writing
Cr.3. Prerequisite: LH 131, LH 132

Orientation - Overview of technical report writing - Background reports - Process reports - Instructions and manuals - Primary research reports - Feasibility reports - Report format - Dictionary skills - Paraphrasing - Summarizing - Further practice on summarizing and paraphrasing - Discussion of report outlines - Presentation skills (CD viewing I) - Quotations and source documentation - Report writing workshop - Use of visual aids in technical writing - Presentation skills (CD viewing II) - Report writing workshop - Mini presentations - Report writing workshop - Rehearsals - End of term presentations.

Mechanical Engineering (ME)

ME 151 – Engineering Drawing & Projection
Cr.2. Prerequisite: None

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.

Non-Engineering (NE)

NE 264 – Scientific Thinking
Cr.3. Prerequisite: None

Introduction about Nature of Scientific Thinking &Thinking Patterns Development; Meaning & Construction of Science + Scientific Values & attitudes; Science, non-science & other-than science +Science, Engineering & Technology; Properties of science; Mental operations used in science and Scientific Guessing; Types of deductions and Representation; Research methods in natural sciences, definitions; Experiments, Observations, Scientific postulates and their conditions; Verification of

scientific postulates; General methods of problems solving; Creative and critical Thinking; Fluency types; Flexibility, Originality and Basics of Brain Storming.

NE 266 - Creativity and Innovation
Cr.3. Prerequisites: None

Definitions – theory and Approach – media – visualization - Applications working both individually and in collaborative groups - students explore their awareness of creativity & innovation.

NE 465 – Aesthetic Education and Art Appreciation
C.r3. Prerequisite: None.

Introduction to fine Arts – Art in our lives – The Basic Meaning of Art- Design elements: Shape and Form – Design elements: Space – Design elements: Texture and pattern –Design elements: Color– Color theory–The Principles of Design: Balance– Emphasis- Contrast–Repetition–The Principles of Design: Proximity– Proportion- Harmony– Unity & Variety–Ethics of engineering.

NE 466: Environmental Science and Technology
C.r3. Prerequisite: None

The biosphere – the natural built environment – ecosystem components and their properties – Environmental resources – properties of ecosystems and equilibrium – The evolution of mankind's relation with the environment throughout different eras – The development of human awareness regarding environment problems – Population growth – Development & Sustainable development – Poverty and the environment – Environment and consumer Life styles – Relation between human health and environmental degradation – Environmental improvement – Economic and social returns/benefits of pollution abatement – Risk analysis – Environmental management.