

Course-Contents

ES101 Mathematics I	
4 Lecture hours per week (4+8) 12 units	
<i>Contents:</i>	
Sets. Real and complex number systems. Functions and their graphs. Vectors in the plane and space. Determinants, solutions of a system of linear equations. limits and continuity of functions. Derivatives, derivatives of elementary functions, Roll's and mean value theorems, maxima, minima and graph sketching, applications of l'Hopital rule.	

ES102 Mathematics II	
4 Lecture hours per week (4+8) 12 units	Prerequisite: ES101
<i>Contents:</i>	
<ul style="list-style-type: none"> • Definite integral, fundamental theorem of calculus. • Exponential and logarithmic functions, hyperbolic functions. • Techniques of integrations. • Geometrical and physical applications of the definite integral. • Functions of several variables, partial derivative. • Maxima and minima and Lagrange's multiples • Line integrals. • Double integrals in rectangular and polar coordinates. • Series, power series, Taylor's theorem. 	

ES111 Physics I	
4 Lecture hours per week (4+8) 12 units	
<i>Contents:</i>	
<ul style="list-style-type: none"> • Mechanics: Linear and circular motion, Newton's Laws of motion, work, energy, conservation laws. • Properties of matter: elasticity, surface tension, fluid mechanics. • Heat and thermodynamics: heat, law of thermodynamics, ideal gas. • Vibration and waves: simple harmonic motion, vibrations, traveling and standing waves, properties and propagation of sound. 	

ES112 Physics II	
4 Lecture hours per week (4+8) 12 units	Prerequisite: ES111
<i>Contents:</i>	
<ul style="list-style-type: none"> • Electricity and magnetism: charge, Coulomb's Law, electric field Gauss's Law, and its applications, electric potential, capacitors and dielectrics, current and resistance, EMF and circuits, magnetic field, magnetic induction hall effect, Ampere's Law, inductors and solenoids, self-induction, R-L and R-C circuits, magnetic properties of matter. • Electromagnetic oscillation. • Waves and optics: light waves, refraction and reflection of light mirrors and lenses and their applications in optical instruments. 	

ES121 Chemistry I	
3 Lecture hours per week (3+6) 9 units	
<i>Contents:</i>	
<ul style="list-style-type: none"> • The course covers the study of the atomic structure, periodic table, gaseous state, thermochemistry, introduction to the different classes of organic compounds with special emphasis on functional groups, nomenclature, isomerism and the fundamental concepts about structure and reactivity. 	

ES122 Chemistry II	
3 Lecture hours per week (3+6) 9 units	Prerequisite: ES121
<i>Contents:</i>	
<ul style="list-style-type: none"> • The course covers the study of the artificial radio-activity, chemical bond, theories of the covalent bond. • Classification of compounds. • The chemical behavior of some common substances, thermodynamics, electrochemistry, solid state chemistry and the organic reaction of alkanes, cycloalkanes, alkenes, alkynes, alkyl halides, alcohols, aldehydes and ketones, with detailed study of reaction mechanisms. 	

ES181 Physics Laboratory I	
3 Laboratory hours per week (3+0) 3 units	Co-requisite: ES111
<i>Contents:</i>	
<ul style="list-style-type: none"> • Laboratory work includes experiments on the acceleration of gravity (g). • Hook's Law Young's modulus, surface tension, thermal conductivity and specific heat, Newton's Law of cooling, sonometer, frequency measurements, and the velocity of sound. 	

ES182 Physical Laboratory II	
3 Laboratory hours per week (3+0) 3 units	Co-requisite: ES112
<i>Contents:</i>	
<ul style="list-style-type: none"> • Laboratory work includes experiments on the verification of Ohm's Law, the e.m.f value and the internal resistance of cells, specific resistivity, electrochemical equivalent of copper, mechanical equivalent of copper, mechanical equivalent. 	

ES183 Chemistry Laboratory I	
3 Laboratory hours per week (3+0) 3 units	Co-requisite: ES121
<i>Contents:</i>	
<ul style="list-style-type: none"> • Laboratory rules and techniques, common reagents, chemical equations, cations and anions, reactions of cations and anions, classification of cations and anions into groups, group reagents and group precipitate of cations, identification of cations and anions from simple morganic compounds. 	

ES184 Chemistry Laboratory II	
3 Laboratory hours per week (3+0) 3 units	Co-requisite: ES122
<i>Contents:</i>	
<ul style="list-style-type: none"> • Volumetric Analysis: use of volumetric apparatus, standard solutions, volumetric calculations, procedure of titrations, indicators, titrations involving acid-base, argentimetric, complexometric and oxidation-reduction reactions, determination of strength of some unknown samples utilizing the above methods of titration. 	

ES261 Introduction to Computer Programming	
3 Lecture hours per week (3+6) 9 units	
<i>Contents:</i>	
<ul style="list-style-type: none"> • Introduction to the organization and characteristics of computers. • Concept of an algorithm. • Flowcharting. • The programming process. • Programming in BASIC Application to numerical and non-numerical problems. 	

ES201 Differential Equations	
4 Lecture hours per week (4+8) 12 units	Corequisite: ES102
<i>Contents:</i>	
<ul style="list-style-type: none"> • Basic concepts. • First-order differential equations. • Equations of second order and higher order. • Boundary value problems. • Series solutions. • Some classical equations. • System of first order equations. • Laplace transform and operational methods. • Simple numerical methods. • Linear difference equations. 	

ES206 Linear Algebra	
4 Lecture hours per week (4+8) 12 units	Prerequisite: ES101, ES102 or equivalent
<i>Contents:</i>	
<ul style="list-style-type: none"> • Vector spaces, matrices and determinants, simultaneous linear equations, linear transformations, eigenvalue problems, canonical forms, numerical linear algebra, linear differential equations, linear programming, inner product spaces. • Applications in various areas such as control theory. • Statistics, linear circuit and vibration theory, etc. 	

EL101 English Language I	
3 Lecture hours per week (3+6) 9 units	
<i>Contents:</i>	
This course is designed for first-year students of Engineering during the first semester of their academic year. It consists of two parts: a) a short refresher course in ordinary English to help bridge the gap between school and university standards; aural/oral approaches and techniques are used; and b) a lengthy intensive course in scientific English to enable the students to understand their lectures and textbooks on engineering topics.	

EL102 English Language II	
3 Lecture hours per week (3+6) 9 units	Prerequisite: EL101
<i>Contents:</i>	
This course is designed for first-year students of Engineering during the second semester of their academic year. It consists of two parts: a) a more advanced course in ordinary English to improve the students' standards in four basic language skills; the aural/oral approach and modern technique are adopted; and, b) a still more intensive course in scientific English to enable the students to pursue their higher and more complex studies in engineering.	

ME101 Engineering Drawing I	
3 Lecture hours per week (3+3) 6 units	
<i>Contents:</i>	
<ul style="list-style-type: none"> • The need for a graphic language. • Use and care of drawing instruments and equipment. • Freehand sketching. • Orthographic projections sectioning and dimensioning of single machine elements. • Isometric drawing and dimensioning. • Space analysis of points and lines with applications. 	

ME102 Engineering Drawing II	
3 Lecture hours per week (3+3) 6 units	Prerequisite: ME101
<i>Contents:</i>	
<ul style="list-style-type: none"> • Thread dimensioning, standard M/C elements assembly, inking, space analysis, views of a point, lines, true length of line and oblique lines, bearing slope and grade. • Steel structure drawing. 	

ES215 Engineering Mechanics I	
4 Lecture hours per week (4+8) 12 units	Prerequisite: ES112, ES102
<i>Contents:</i>	
<ul style="list-style-type: none"> • Force systems, forces in plane and in space, equilibrium of forces. • Properties of plane areas, centroid, moment of inertia, moment of mass, radius of gyration, principal axes. • Analysis of statically determinate structures, shear and bending moment diagrams. 	

ES216 Engineering Mechanics II	
4 Lecture hours per week (4+8) 12 units	Prerequisite: ES112, ES215 Corequisite: ES201
<i>Contents:</i>	
<ul style="list-style-type: none"> • Motion, velocity, and acceleration. • Uniform rectilinear motion, components of motion, relative motion. • Work and energy, impulse and momentum. • Mechanical vibrations, free and damped vibrations, forced vibrations. • Static and Dynamic Friction. 	

CE215 Surveying I	
4 Lecture hours per week (4+8) 12 units	Prerequisite: ES102
<i>Contents:</i>	
<ul style="list-style-type: none"> • Chain survey, leveling, contouring. • Traversing and its computations, theodolites. • Area and its computation; volumes from cross-sections and contours. • Tachometry system. • Plane table. 	

CE216 Surveying II	
9 Lecture hours per week (9+6) 15 units	Prerequisite: CE215
<i>Contents:</i>	
<ul style="list-style-type: none"> • Circular, transition and vertical curves. • Principles of electro optical distance measurements. • Systems of triangulation. • Errors and mistakes, adjustment. • Introduction to field astronomy. • Introduction to photogrammetry. 	

CE222 Strength of Materials	
4 Lecture hours per week (4+8) 12 units	Prerequisite: ES215, ES201
<i>Contents:</i>	
<ul style="list-style-type: none"> • Stresses and strains, linearly elastic material, axial forces, bending moment, shear force and torsional moment. • Combined stresses. • Mohr's circle. • Deflections of beams. • Buckling of columns. 	

CE224 Strength of Material Laboratory	
3 Laboratory hours per week (3+0) 3 units	Corequisite: CE222
<i>Contents:</i>	
<ul style="list-style-type: none"> • Tensile and compressive tests for ductile, semiductile and brittle materials. • Bending tests for metallic and non-metallic beams. • Torsion tests of metallic shafts. • Tests for shear in connections. 	

CE226 Building and Architecture	
3 Lecture hours per week (3+3) 6 units	
<i>Contents:</i>	
<ul style="list-style-type: none"> • Meaning and role of Architecture, especially in relation to engineering. • Principles in designing architectural details, dimensioning, human scale, technical and economical factors. • Visits to some buildings of architectural interest. 	

CE271 Geology for Civil Engineers	
6 Lecture hours per week (6+6) 12 units	
<i>Contents:</i>	
<ul style="list-style-type: none"> • Rocks and minerals; physical processes. • Deformation of Rocks; earthquakes. • Application of geology to engineering practice; Dams and tunnels, landslides, construction materials, geophysical investigations. • Hydrogeology. 	

CE323 Structural Analysis I	
4 Lecture hours per week (4+8) 12 units	Prerequisite: CE222
<i>Contents:</i>	
<ul style="list-style-type: none"> • Statical determinacy. • Analysis of beams, frames and trusses; shear and moment diagrams; influence lines. • Deflection analysis using moment area and conjugate-beam methods. • Use of moment distribution in indeterminate structures (without sway). 	

CE324 Structural Analysis II	
4 Lecture hours per week (4+8) 12 units	Prerequisite: CE323
<i>Contents:</i>	
<ul style="list-style-type: none"> • Analysis of indeterminate structures: moment distribution, slope deflection method, superposition method, three moment theorem, etc. • Deflection Analysis: virtual work method, conjugate-beam method, etc. • Introduction to Stiffness and Flexibility materials. 	

CE325 Fluid Mechanics	
4 Lecture hours per week (4+8) 12 units	Prerequisite: ES102, ES112
<i>Contents:</i>	
<ul style="list-style-type: none"> • Fluid properties. • Fluid statics. • Fluid flow concepts and equations. • Viscous effects-fluid resistance. • Compressible flow. • Ideal fluid flow. • Flow in closed conduits and open channels. 	

CE327 Fluid Mechanics Laboratory	
3 Laboratory hours per week (3+0) 3 units	Corequisite: CE325
<i>Contents:</i>	
<ul style="list-style-type: none"> • Fluid properties. • Center of pressure. • Metering hydraulic jump. • Hydraulic and energy grade lines in pipe flow. • Flow in pipe networks. • Potential flow. • Compressible flow. • Flow visualization. • Electric analogy. • Impulse turbines. • Hydraulic machinery. 	

CE329 Soil Mechanics	
4 Lecture hours per week (4+8) 12 units	Prerequisite: CE222
<i>Contents:</i>	
<ul style="list-style-type: none"> • Simple soil properties, particle size distribution, sedimentation, Atterberg limits, soil classification, permeability and seepage, flow nets, compaction of soils, stress in soils, consolidation and settlement, shear strength of soils. 	

CE331 Soil Mechanics Laboratory	
3 Laboratory hours per week (3+0) 3 units	Corequisite: CE329
<i>Contents:</i>	
<ul style="list-style-type: none"> • Moisture content; relative density, in-situ density, Atterberg limits, grain size analysis; standard and modified proctor test, California bearing ratio (C.B.R); consolidation; shear strength of soils, field collection of samples. 	

CE333 Highway and Transportation Engineering	
3 Lecture hours per week (3+6) 9 units	Prerequisite: CE216, Corequisite: CE329
<i>Contents:</i>	
<ul style="list-style-type: none"> • Rout location, highway materials, drainage geometric design, traffic survey and control, bituminous and concrete pavement design, environmental impact. 	

CE336 Structural Design I (Steel)	
6 Lecture hours per week (6+6) 12 units	Prerequisite: CE323
<i>Contents:</i>	
<ul style="list-style-type: none"> • Study of metals and modes of failures, design of compacted and slender beams and columns under tension, compression, flexure, shear and bearing. • Design of structural connections. • Imposed loads and forces; codes and specifications. 	

CE338 Ground Water hydrology	
4 Lecture hours per week (4+8) 12 units	Prerequisite: CE325
<i>Contents:</i>	
<ul style="list-style-type: none"> • The hydrologic cycle. • Occurrence of ground water. • Ground water movement; Darcy's law. • Well hydraulics. • Sea water intrusion in costal aquifers, leakage and multilayered aquifers. 	

CE342 Civil Engineering Materials	
3 Lecture hours per week (3+6) 9 units	
<i>Contents:</i>	
<ul style="list-style-type: none"> • Concrete: Constituent materials and their properties, mix design, strength and durability, admixture and quality control. • Steel: Structure, properties, deformation characteristics, creep and fatigue. 	

CE344 Civil Engineering Materials Laboratory	
3 Laboratory hours per week (3+0) 3 units	Corequisite: CE342
<i>Contents:</i>	
<ul style="list-style-type: none"> • Cement: Properties, tests, admixtures, and manufacture. • Aggregate: Sampling, fineness modulus, and surface chemistry and tests. • Concrete Mix: Design, slump, modulus of rupture, strength and durability and testing. 	

CE346 Environmental Engineering I	
3 Lecture hours per week (3+6) 9 units	Prerequisite: CE325
<i>Contents:</i>	
<ul style="list-style-type: none"> • Elements of water supply systems. • Factors affecting water consumption. • Population projection and water forecast. • Design of water collection and distribution systems. 	

CE451 Structural Design II (Concrete)	
6 Lecture hours per week (6+6) 12 units	Prerequisite: CE323
<i>Contents:</i>	
<ul style="list-style-type: none"> • Reinforced concrete: Behavior studies, introduction to working stress design, codes and specification requirements. • Ultimate strength design: Beams, one way slabs, columns to accommodate for flexure, shear, bond and development length and defacting. 	

CE453 Structural Design III	
6 Lecture hours per week (6+6) 12 units	Prerequisite: CE336, CE451, CE329
<i>Contents:</i>	
<ul style="list-style-type: none"> • Part (A): Design of metals: Bolted and welded plate girders, web and flange buckling considerations, wind bracing. Introduction to torsion. • Part (B): Design of reinforced concrete: Two way slab, flat slab, retaining walls and brackets. 	

CE455 Environmental Engineering II	
3 Lecture hours per week (3+6) 9 units	Prerequisite: CE346
<i>Contents:</i>	
<ul style="list-style-type: none">• Types of sewers.• Waste water forecast.• Factors affecting amount of domestic sewage.• Hydraulics of sewers.• Design of sanitary, storm and combined sewers.• Sewer appurtenances.• Pumping of sewage.	

CE456 Professional Practice	
2 Lecture hours per week (2+4) 6 units	
<i>Contents:</i>	
<ul style="list-style-type: none">• The role of the Engineer.• Relationship of engineer/architect with other parties.• Professional ethics.• Legal and financial aspects of engineering profession.• Contracts and professional responsibility.	

CE458 Specification and Quantities	
2 Lecture hours per week (2+4) 6 units	
<i>Contents:</i>	
<ul style="list-style-type: none">• Contract procedure and administration.• Inviting tenders.• Preparation of bills of quantities.• Quantities in geotechnically processes.• Concrete, piling, timber, steel, and other metals, roads and paving.	

CE461 Construction Management & Economics I
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6 Lecture hours per week (6+6) 12 units

<i>Contents:</i>

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| <ul style="list-style-type: none"> • Introduction to the construction industry. • Forms of business ownership; contracts and legal relations: organizations and organizational structure, labor relations and motivation. • Planning and scheduling, PERT and CPM networks, site organization and planning. |
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CE462 Construction Management & Economics II

6 Lecture hours per week (6+6) 12 units

Prerequisite: CE461

<i>Contents:</i>

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| <ul style="list-style-type: none"> • Cost accounting, financial evaluation of project proposals. • Cost flows financial statements. • Estimating and pricing. • Methods improvement. • Formwork design. |
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CE471 Surface Hydrology

6 Lecture hours per week (6+6) 12 units

Prerequisite: CE325

<i>Contents:</i>

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| <ul style="list-style-type: none"> • Precipitation. • Interception and evaporation, transpiration. • Surface runoff and stream flow. • The datchment. • Soil moisture. • Soil irrigation drainage. • Stochastic hydrology. • Water resources systems. |
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CE472 Airport Planning and Design	
6 Lecture hours per week (6+6) 12 units	Prerequisite: CE333
<i>Contents:</i>	
<ul style="list-style-type: none">• Various features of modern aircrafts.• Layout of airport terminal building, runways, capacity; design of pavement structure; environment features; design and operation of heliports.	

CE473 Foundation Engineering	
6 Lecture hours per week (6+6) 12 units	Prerequisite: CE329, CE331
<i>Contents:</i>	
<ul style="list-style-type: none">• Soil exploration.• Bearing capacity theories.• Field determination.• Theory of consolidation.• Settlement analysis.• General design criteria of footing and rafts.• Pile foundation.• Stability of slopes.• Earth pressure.• Retaining wall.	

CE474 Ground Water Recovery	
6 Lecture hours per week (6+6) 12 units	Prerequisite: CE325, CE338
<i>Contents:</i>	
<ul style="list-style-type: none"> • Water extraction by wells and galleries. • Ground water levels and fluctuations. • Quality of ground water. • Basin wide ground water development. Surface and subsurface investigations. • Artificial recharge. • Ground water models. 	

CE475 Advanced Surveying & Geodesy I	
6 Lecture hours per week (6+6) 12 units	Prerequisite: CE216
<i>Contents:</i>	
<ul style="list-style-type: none"> • Geodetic triangulation, trilateration. • Errors, principle of least squares, adjustment of geodetic results. • Trigonometrical leveling. • Field astronomy-spherical trigonometry. 	

CE476 Advanced Soil Mechanics	
6 Lecture hours per week (6+6) 12 units	Prerequisite: CE329
<i>Contents:</i>	
<ul style="list-style-type: none"> • Clay mineralogy. • Shear strength of soils, soft and difficult soils. • Triaxial testing rheological properties of soils plasticity. • Flow net, numerical methods. • Pore pressure parameters. • Isochrones. • Sand drains. 	

CE477 Advanced Mathematics and Computing I	
6 Lecture hours per week (6+6) 12 units	Prerequisite: ES201, ES206
<i>Contents:</i>	
<ul style="list-style-type: none">Analytical solution of civil engineering problems in the areas of elasticity, fluid mechanics, soil mechanics, structural mechanics and transportation engineering.	

CE478 Advanced Surveying and Geodesy II	
6 Lecture hours per week (6+6) 12 units	Prerequisite: CE475
<i>Contents:</i>	
<ul style="list-style-type: none">Airphotograph, stereoscopic measurements.Mean seal level, tide gauges, sounding location.Three point problem.Discharge measurement.	

CE480 Advanced Mathematics and Computing II	
6 Lecture hours per week (6+6) 12 units	Prerequisite: CE477
<i>Contents:</i>	
<ul style="list-style-type: none">Numerical solution of civil engineering problems in the areas of elasticity, fluid mechanics, soil mechanics, structural mechanics and transpiration engineering.	