

Courses-Contents

ES101 Mathematics I	
4 Lecture hours per week, (4+8) 12 Units	
<i>Contents:</i>	
<ul style="list-style-type: none">• Set. Real and complex number systems.• Function and their graphs.• Vectors in the plan and space.• Determinants, solutions of a system of linear equations.• Limits and continuity of functions.• Derivatives, derivatives of elementary function.• Roll's and Mean value theorems, maximum, minimum and graph sketching, applications of L'hospital rule.	

ES102 Mathematics II	
4 Lecture hours per week, (4+8) 12 Units	Prerequisite(s): ES101
<i>Contents:</i>	
<ul style="list-style-type: none">• Definite integral, fundamental theorem of calculus.• Exponential and functions, hyperbolic function.• Techniques of integration.• Geometrical and physical applications of the definite integral.• Functions of several variables, partial derivative.• Maximum and minimum and Lagrange's multipliers.• 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, and fluid mechanics. • Heat and thermodynamics: Heat, laws 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(s): ES111
<i>Contents:</i>	
<ul style="list-style-type: none"> • Electricity and magnetism: Charge, Coulomb's Law, electric field. • Gauss's Law, and its application, electric potential, capacitors and dielectrics, current and resistance EMF and circuits, 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 oscillators, E.M.W and Maxwell's equations, transmission lines, traveling waves. • Alternating currents and voltages. • 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, thermos-chemistry, and introduction to the different classes of organic compounds with special emphasis of functional groups, nomenclature, somerism and fundamental oncepts about structure and reactivity. 	

ES122 Chemistry II	
3 Lecture hours per week, (3+6) 9 Units	Prerequisite(s): ES121
<i>Contents:</i>	
<ul style="list-style-type: none">• The course covers the study of artificial radio-activity, chemical bonds, theory of covalent bond, classification compounds, the chemical behaviour of some common substances, thermodynamics, electrochemistry, solid-state chemistry and the organic reaction of alkanes, cycloalkanes, alkenes, alkyl halides, alcohols, aldehydes and ketones, with detailed study of reaction mechanisms.• Volumetric analysis.• Use of volumetric apparatus, standard solutions, volumetric solutions, procedure of titration, indicators titration involving acid-base, argentometric, complexometric and oxidation-reduction reactions, determination of strength of some unknown samples utilising the above methods of titration.	

ES201 Different Equations	
4 Lecture hours per week, (4+8) 12 Units	Prerequisite(s): 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(s): 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, linear product spaces. • Applications in various areas such as control theory. • Statistics, linear circuit and vibration theory, etc. 	

ES214 Material Science	
3 Lecture hours per week, (3+6) 9 Units	Prerequisite(s): ES122
<i>Contents:</i>	
<ul style="list-style-type: none"> • Basically this course is similar to ES 211, with the exception that more stress will be put on electrical processes in solids such as electronic properties, semi-conduction and magnetic behaviour. 	

ES215 Engineering Mechanics I	
4 Lecture hours per week, (4+8) 12 Units	Prerequisite(s): ES112, ES102
<i>Contents:</i>	
<ul style="list-style-type: none"> • Forces on particles and rigid bodies in two and three dimensions. • Equilibrium of forces on particles and rigid bodies in two and three dimensions. • Centroids and center of gravity. • Moments of inertia. • Second moment of areas. • Parallel-axis theorem. • Mass moment of inertia. • Friction. • Reactions, shearing forces bending moments and axial forces in statically determinate beams. 	

- Principles and techniques of numerical mathematics commonly used by engineers.
- Topics include numerical solutions of algebraic systems, eigenvalue problems, numerical integration, the solution nonlinear equations, interpolation and approximation, solutions of ordinary and partial differential equations.
- Additional topics, such as fast Fourier transform, linear and dynamic programming will be included if time permits.
- Students shall be trained to organize mathematical problems for solution on digital computers.

English Language Division Courses

EL101 English I	
3 Lecture hours per week, (3+6) 9 Units	
<i>Contents:</i>	
<ul style="list-style-type: none"> • This course is design 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 lengthily intensive course in scientific English to enable the students to understand their lectures and textbooks on engineering topics. 	

EL102 English II	
3 Lecture hours per week, (3+6) 9 Units	Prerequisite(s): EL101
<i>Contents:</i>	
<ul style="list-style-type: none"> • This course is design 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 student's standards in the four basic language skills; the aural/oral approach and modern techniques are adopted; and, (b) a still more intensive course in scientific English to enable the student to pursue their higher and more complex studies in engineering. 	

ES215 Engineering Mechanics I (for civil engineers)	
4 Lecture hours per week, (4+8) 12 Units	Prerequisite(s): ES112, ES102
<i>Contents:</i>	
<ul style="list-style-type: none">• Basic concepts.• Force and displacement as vectors.• Force systems.• Static equilibrium.• Distorted forces.• Analysis of single structures.• Shear and moments diagrams.• Properties of surfaces.	

ES216 Engineering Mechanics II	
4 Lecture hours per week, (4+8) 12 Units	Prerequisite(s): ES215
<i>Contents:</i>	
<ul style="list-style-type: none">• Kinematics of particles including rectilinear and curvilinear motion.• Kinetics of particles, force, mass, acceleration, work and energy, impulse and momentum.• Kinematics of rigid bodies including translation, rotation and plane motion.• Kinetics of rigid bodies.• Free and forced mechanical vibrations.	

ES216 Engineering Mechanics II (for civil engineers)	
4 Lecture hours per week, (4+8) 12 Units	Prerequisite(s): ES215
<i>Contents:</i>	
<ul style="list-style-type: none">• Friction principal of virtual work.• Kinematics of rigid body motion, relative motion, impulse and momentum.• Work and energy.• Dynamics of vibrating systems.	

ES261 Fundamentals of Computers and Programming	
3 Lecture hours per week, (3+6) 9 Units	
<i>Contents:</i>	
<ul style="list-style-type: none"> • Introduction to the organisation and characteristics of computers. • Concepts of an algorithm. • Flowcharting. • The programming process. • Programming in FORTRAN. • Programming in Basic. • Application to numerical and non-numerical problems. 	

ES301 Mathematical Analysis and its Applications	
3 Lecture hours per week, (3+6) 9 Units	Prerequisite(s): ES101, ES102, ES201 or the consent of instructor.
<i>Contents:</i>	
<ul style="list-style-type: none"> • Analytic function, singularities and expansions. • The residue theorem and its applications. • Conformal transformations; Fourier Series. • Fourier and Laplace transforms, other, transforms, boundary values problems, variational methods. 	

ES302 Numerical Analysis	
3 Lecture hours per week, (3+6) 9 Units	Prerequisite(s): ES201, ES206, ES261
<i>Contents:</i>	
<ul style="list-style-type: none"> • 	

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(s): ME101
<i>Contents:</i>	
<ul style="list-style-type: none"> • Thread dimensions, 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. 	

ES125 General Introduction to Environmental Pollution	
<i>Contents:</i>	
<ul style="list-style-type: none"> • Introduction: Definition of pollution and contamination. • Air pollution: Introduction, types of air pollutants, lead and acid rain (SO₂ NO_x), effects of air pollution on the environment and human health, air quality criteria, air pollution monitoring and control, particulate control of air pollution, air pollution control in selected application, stack design. • Water pollution: Introduction, sources of water pollution, industrial effluents, Sewage effluent (organic demanding wastes), biodegradation, concentrations of pollutants in water, pollution of groundwater, water quality standards and (BOD), water pollution control, waste water treatment process. • Marine pollution: introduction, definition, sources of pollution, types of pollutants, heavy metals, spilled petroleum hydrocarbons, toxicity of pollutants (Acute and chronic effect), environmental impact of pollutants, effect of marine pollution to human health, marine pollution monitoring and control, quality criteria and modelling PLI index and Igeo. 	