**1st Semester Course Outline for Electrical 200L**

1. GEG 217 (Engineering Calculus III) 2units

- Matrices and Linear transformations

- Elementary Complex Analysis: Logarithmic, Exponential and Circular complex functions

- Mapping by elementary complex functions; Conformal mapping

- Limit, Continuity and Differentiability of Complex functions; Cauchy-Riemann’s Equations; Complex line integrals

* Integration of functions of Complex Variables
* Cauchy’s Integral Theorem; Cauchy’s Integral Formula; Residue Theorem
* Laurent Series

1. GEG 219 (Ordinary Differential Equations) 2units

* Introduction to Differential Equations; Linear dependence; Classification of Ordinary Differential Equations; Order, Degree and linearity.
* Types and Techniques of solution of first order ODE’s; Picard’s iterative method; physical applications of first order ODE.
* Theory and solutions of higher order linear equations; physical applications.
* Ordinary differential equations with constant coefficients; methods of undetermined coefficients, variation of parameters, D-Operator.
* Linear Differential Equations with Variable coefficients.
* Cauchy-Euler’s equations
* Systems of linear operations
* Properties of linear operations
* Series solution
* First order non-linear equations: autonomous, equidimensional and scale-invariant

1. EEG 211 (Fundamentals of Electrical Engineering I) 2units

* Circuit Law: Kirchhoff’s Laws, Thevenin’s Theorem, Norton’s Theorem, Superposition Theorem, Millman’s Theorem, Rosen’s Theorem.
* Network problems arising in Energy Distribution
* Methods of analysis suitable for the problems in Network theory in terms of currents, voltages, energy/volt amperes, Loop and Nodal analysis.
* Resistors, Electric field and capacitors, Magnetic fields and Inductance
* Energy stored in capacitors and Inductors
* Electromagnetic Induction and Magnetic forces, self and mutual Inductance
* Electrochemical power sources
* Pre-requisite: FSC 115

1. EEG 213 (Signals and Systems Theory) 2units

* Continuous and discrete signals , transformations and inverse transformations, spectral analysis of steps, ramps and impulse, signal descriptions by impulse and step functions.
* The independent variable; definitions of rise-lime, settling time, overshoot, period magnitude and duration of a signal.
* Fourier Analysis, Parseval’s Theorem, Periodic and Non-periodic signals, Devices and Models, Network analysis circuits with independent and dependent sources.
* Time invariant and stationary systems
* Pre-requisite: PHS 121

1. EEG 215 (Elect Engineering Materials) 2units

* Introduction to Quantum and Statistical Mechanism
* Structure of Solids
* Electrons in Solids
* Dielectric Properties; Breakdown, piezo and ferro-electric effect
* Magnetic properties, physics of Magnetic Materials
* Atomic moment, The transition elements.
* Magnetic alloys Ferrites, Thermal properties of materials
* Optical properties of materials
* Introduction to Transducers
* Pre-requisite: PHS 122

1. EEG 217 (Electrical System Graphics) 2units

* Software tools for computer graphics, analytic geometry and computer graphics
* Basics of 3-D graphics
* Hidden line and Hidden surface routines.
* Graphic Theory
* Simulations of circuit element, devices and components
* Simulation of Electronics Circuits
* Pre-requisite: FSC 115

1. EEG 231 (Fundamentals of Electrical Engineering I Laboratory) 1unit

* The Laboratory course for Fundamentals of Electrical Engineering is designed to illustrate the topics covered in the course- Kirchhoff’s voltage law, Kirchhoff’s current law, Thevenin’s theorem, Maximum Power transfer, Superposition theorem, Variation of Impedance and Current of a series RLC circuit with changes in frequency, RC and RL circuits, Diodes, Clippers and Clampers, Rectification and Filter Circuits, AC voltage and phase shift on CRO.

1. MEG 211 (Engineering Drawing) 2units

* Introduction to drawing instruments and their proper use
* Use of scales, linework, lettering and dimensioning
* Geometrical Constructions including tangents, normal, polygons etc.
* Loci, including paths of simple mechanisms and cam profiles
* Orthographic projections of simple objects in first and third angles.
* Isometric and Oblique Projections
* Isometric projections from orthographic projects

1. CEG 211 (Mechanics of Materials I) 3units

* Forces, Moments, couples, resultants and equivalent force systems
* Direct stresses and strains, Hooke’s law
* Method of superposition stresses and deformation resulting from temperature changes, stresses in thin Cylinder and spheres
* Stresses on inclined planes, principal stresses
* Structural mechanics of statically determinate body systems and plane jointed frames