Course Details

Department of

Electrical & Electronic Engineering

Last revised on June 2016
PHY 1101: Physics 1

PHY 1101: Physics 1

PHY 1102: Physics 1 Lab

PHY 1102: Physics 1 Lab. Laboratory works based on PHY 1101

CHEM 1101: Chemistry


MAT 1102: Differential Calculus And Co-Ordinate Geometry


ENG 1101: English Reading Skill & Public Speaking

ENG 1101: English Reading Skill & Public Speaking The course is aimed at strengthen student's reading comprehension skills and enrich their vocabulary by reading and reacting to a variety of adapted and authentic texts. Students also improve oral communication skills for professional and social interactions through extensive conversational practice. Practice includes forming and communicating opinions on contemporary issues, developing formal and informal oral presentations, giving and following directions, and narrating and giving explanations.
### CSC 1102: Programming Language 1

CSC 1102: Programming Language 1 Starting Concept of Computer Programming; Introducing with the C editor's environment; Introduction to Data Types; Different Types of Operators; Different Types of Expression Evaluation; Type casting; Introduction to Conditional Operators; if statement; switch statement; goto statement; Introduction to loops (while, do-while, for); Concept and use of array; Declaring one and two-dimensional arrays; Storing and accessing array elements manually and through loops; Introduction to string. scanning and printing strings; Different types of string manipulation; Introduction to pointers; use of pointers; Calling and accessing pointer type variables; Introduction to function; Defining and calling functions; Sending and receiving parameters; Scope of variables; Introducing call by value and call by reference. Introduction to structure and union; Use of structures; Defining and accessing structures; Nested structure; File manipulation; Creating file; Opening file in different modes; Storing and retrieving information from file. Introduction to object oriented Programming. Laboratory works based on taught theory.

### PHY 1203: Physics 2


### PHY 1204: Physics 2 Lab

PHY 1204: Physics 2 Lab. Laboratory works based on PHY 1203

### BAE 1201: Basic Mechanical Engineering

BAE 1201: Basic Mechanical Engineering Study of steam generation units and their accessories and mountings; Properties of Steam, internal energy, enthalpy and quality of steam, saturated and superheated steam, uses of steam tables, Mollier Charts. Steam power cycles, Rankine cycle, Low pressure and high pressure feed heaters. Deaerators and condensers. Second law of thermodynamics.; availability, irreversibility and entropy. Introduction to internal combustion engines and gas turbines. Steam turbines and their important accessories: low pressure and high pressure turbines, start, operation and shut down, lubrication, turbine glands and gland sealing. Steam extraction and regenerative feed heating. Introduction to pumps, blowers and compressors, refrigeration and air conditioning systems. Mixtures of air and vapor. Uses of Psychometric chart. Visit to power generating station in order to familiarize students with all the generating equipment and associated auxiliary plant equipment in operation. They must visit some selected power stations in the country under the supervision of faculty members as decided by the concerned department. The visit must be included as an essential part of the course and as such the same may be taken into consideration in grading of the students in this course.

### MAT 1205: Integral Calculus And Ordinary Differential Equations

MAT 1205: Integral Calculus And Ordinary Differential Equations Differential Calculus: Limit, continuity and differentiability, successive differentiation of various types of functions, Leibnitz's rule, Taylor's theorem in finite and infinite forms. Maclaurin's theorem in finite and infinite

CSC 2207: Programming Language 2

CSC 2207: Programming Language 2 Philosophy of Object Oriented Programming (OOP): Advantages of OOP over Structured programming: Encapsulation. Classes and objects access specifiers. Static and non-static members, Constructors, Destructors and copy constructors, Array of objects, object pointers and object references, Inheritances, Single and multiple inheritance, polymorphism, overloading, abstract classes, virtual functions and overriding, Exception: Object Oriented I/O: Template functions and classes: Multi-threaded Programming. Laboratory works based on taught theory.

EEE 1201: Electrical Circuits 1 (DC)

EEE 1201: Electrical Circuits 1 (DC) This is core course of Electrical and Electronic Engineering program 1) Definition of Voltage, Current, Power, Energy; Conductors, Insulators, Semiconductors and Superconductors; Resistance and Conductance, Temperature Effects on resistance of a material, Ohm’s Law, Total resistance of a series circuit; Kirchhoff’s Voltage law (KVL); Related Problems. 2) Voltage divider rule, Related Problems; Voltage sources and ground, Single subscription and double subscription notation of voltages. Internal resistance of voltage source; Total resistance and conductance of a parallel circuit, Kirchhoff’s Current Law (KCL); Current divider rule; Related Problems. 3) Voltage sources in series; Voltage sources in parallel; Open and short circuits, related problems; Series-Parallel network; Methods for solving such networks, related problems; Ladder networks, Voltage Divider (loaded and unloaded); Current sources; related problems. 4) Source conversion; Current sources in parallel, current sources in series; Related problems; Branch current analysis; Mesh Analysis; Related problems. Super-Mesh Analysis; Related problems. Nodal Analysis; Super-Node Analysis; Related problems. 5) Y-Delta and Delta-Y conversions; Related problems; Dependent Current Source, Dependent Voltage Source; Continuation of dependent sources; Related Problems. 6) Superposition Theorem; Related problems. Thevenin’s Theorem; Related problems. Norton’s Theorem; Maximum Power Transfer Theorem; Related problems. Millman’s Theorem; Reciprocity Theorem; Related problems. 7) Electric Field; Capacitance; Dielectric strength; leakage current, Various types of capacitors. Transients in Capacitive networks: Charging Phase; Related problems. Transients in Capacitive networks: Discharge phase; Related problems. Continuation of transients in Capacitive networks; Energy stored by capacitor; Stray capacitance; Capacitors in series and parallel; 8) Magnetic Field; Magnetic flux density, Permeability. Inductor; Related Problems. Faraday’s law of electromagnetic induction; Lenz’s law; Self-inductance; Related Problems. R-L transient; Storage cycle; Related Problems. R-L transient; Decay phase; Inductors in series and parallel; Related Problem. R-L and R-C circuits with DC inputs; Energy stored by an inductor; Related problem. 9) Magnetic circuits; Magnetomotive force, magnetizing force; Reluctance. Ohm’s law for magnetic circuits; Magnetizing Force; Hysteresis; Related Problems. Ampere’s circuital law; Series magnetic circuits; Series/Parallel magnetic circuits; Related Problems.

EEE 1202: Electrical Circuits 1 (DC) Lab

EEE 1202: Electrical Circuits 1 (DC) Lab Laboratory works based on EEE 1201.

MAT 2101: Complex Variable, Laplace Transform And Z -Transform


**PHY 2103: Modern Physics**

CSC 2207: Programming Language 2 Philosophy of Object Oriented Programming (OOP): Advantages of OOP over Structured programming.

**PHY 2103: Modern Physics** Introduction to Special theory of relativity, Einstein’s postulates, the basic ideas of Galilean and Lorentz transformation, concepts of time dilation, length contraction, relativistic momentum and energy, invariant mass, mass-energy equivalence, relativistic Doppler effect. Blackbody radiation, Rayleigh and “Ultra Violet Catastrophe”, Planck and the Quantum Hypothesis, energy quantization in blackbody radiation, Photoelectric effect & Compton scattering. Wave-particle duality, De Brogile’s hypothesis and matter waves, Heisenberg’s uncertainty principle, Energy levels and the Bohr model of the atom, the uncertainty principle and the limits of the Bohr model. Quantum mechanics, Wave functions and the one dimensional Schrodinger equation, particle in a box, wave functions for a particle in a box, energy levels for a particle in a box, probability and normalization, finite potential well, potential barriers and tunneling effect, the quantum harmonic oscillator, the time dependent Schrodinger equation. Nuclear Physics: properties of nuclei, nuclear binding and nuclear structure, nuclear stability and radioactivity, decay rates and half-lives, mass defect and nuclear binding energy, nuclear energy due to radioactivity, fission and fusion processes, fissile and fertile material, nuclear chain reaction, time scales of nuclear chain reaction, effective multiplication factor. Different parts of nuclear power plants, fuel rod, enriched uranium, moderator, control rods, coolant, containment structure, different types of nuclear power reactors, current developments, prototype designs, radiation, health and society. Energy bands, free electron model of metals, semiconductors, carrier concentration in intrinsic semiconductors.

**ENG 1202: English Writing Skills And Communication**

ENG 1202: English Writing Skills And Communication The course is designed to study various rhetorical patterns and use their writing skills to develop essays in these patterns. The rhetorical patterns studied in this course are process analysis, cause and effect, and argument/persuasion. Students will also learn the process of writing. This course will help students learn how to think more clearly, organize thoughts in logical sequence, and improve writing skills through prewriting, writing, and rewriting processes. The underlying premise of the course is that the students who take it are inexperienced writers who need practice, not that they are incapable. Like other composition courses, the course will help students develop essays in these patterns. The rhetorical patterns studied in this course are process analysis, cause and effect, and argument/persuasion. Students will also learn the process of writing. This course will help students learn how to think more clearly, organize thoughts in logical sequence, and improve writing skills through prewriting, writing, and rewriting processes. The underlying premise of the course is that the students who take it are inexperienced writers who need practice, not that they are incapable. Like other composition courses, the course will help students learn how to think more clearly, organize thoughts in logical sequence, and improve writing skills through prewriting, writing, and rewriting processes.
EEE 2102: Electrical Circuits 2 (AC) Lab

EEE 2102: Electrical Circuits 2 (AC) Lab Laboratory works based on EEE 2101.

EEE 2103: Electronic Devices

EEE 2103: Electronic Devices 1) Semiconductors: electron and holes in an intrinsic semiconductor, donor and acceptor impurities. 2) Introduction to solid state electronics: Energy band structure in solids, insulators, semiconductors and metals, Conductance and semiconductors, electrons and holes. 3) Diodes: open circuit p-n junction, diode characteristics, small signal model of diode, and circuit applications of diode, rectifiers and zener diode. 4) Bipolar junction transistors: characteristics, different configuration of transistor amplifiers, voltage and current amplifiers small signal low frequency h parameter model analysis of transistor amplifier using h parameters, high input resistance transistor circuits, transistor biasing and thermal stabilization. 5) MOSFET: Introduction- PMOS, NMOS and CMOS transistors and their switching characteristics, depletion and enhancement MOSFET.

EEE 2104: Electronic Devices Lab

EEE 2104: Electronic Devices Lab Laboratory works based on EEE 2104.

BAE 2101: Computer Aided Design & Drafting


MAT 2202: Matrices, Vectors And Fourier Analysis


EEE 2205: Digital Logic Design

EEE 2205: Digital Logic Design This is core course of Electrical and Electronic Engineering program that presents basic tools for the design of digital circuits. It serves as a building block in many disciplines that utilize data of digital nature like digital control, data communication, digital computers etc. The goal of this course is to: 1) Perform arithmetic operations in many number systems. 2) Manipulate Boolean algebraic structures. 3) Simplify the Boolean expressions using Kamaugh Map. 4) Implement the Boolean Functions using NAND and NOR gates. 5) Analyze and design various combinational logic circuits. 6) Storage Elements: Introduction to the behavior and structure of latches, flip-flops, and registers. 7) Understand the importance of state diagram representation of sequential circuits. 8) Sequential Circuits: Analyze and design clocked sequential circuits. 9) Timing Analysis: Introduction to timing analysis of combinational and sequential circuits 10) Briefly introduce the concept of Hardware Description Language (HDL) using VHDL

EEE 2206: Digital Logic Design Lab

EEE 2206: Digital Logic Design Lab Laboratory works based on EEE 2105.
EEE 2207: Electrical Machines 1

This is core course of Electrical and Electronic Engineering program that presents basic DC electrical machines and transformers. It serves as a building block in many disciplines that utilize DC generator, motor and transformer. The goal of this course is to:
2) DC generator: operating principle, classifications, constructions, armature windings, voltage build up, commutation technique, armature reactions, performance and testing.
3) DC motor: operating principle, types of dc motors, dc motor characteristics, methods of speed control.
4) Transformer: operating principle, structural details, vector diagrams of a single phase transformer, equivalent circuits, transformer at load and no load conditions, transformer losses and efficiency, voltage regulation.
5) Induction motor: operating principle, structural details, equivalent circuits, speed-torque relations, circle diagram, losses and efficiency.

EEE 2208: Electrical Machines 1 Lab

Laboratory works based on EEE 2207

EEE 2209: Analog Electronics 1

This is core course of Electrical and Electronic Engineering program that presents basic tools for the design of analog circuits. It promotes the knowledge about the design and implementation of analog electronics circuits for practical engineering applications and formulating their solutions. The goal of this course is to:
3) Active Filter: Analyze and design different types of filter.
4) Transistor at High Frequencies: Observe the performance of hybrid model and the amplifier response.
5) Feedback Amplifiers: Classify the amplifiers and analyze different methods of a feedback amplifier. Introduction to negative feedback amplifiers and their application.
6) Multistage Amplifiers: Achieve a clear idea about RC coupled amplifiers and their frequency response.

EEE 2210: Analog Electronics 1 Lab

Laboratory works based on EEE 2109

BBA 1102: Principles of Accounting

This course deals with the accumulation and use of accounting data in business, fundamental procedures and records, income measurement and preparation of financial statement. It introduces concepts, principles and system of book keeping and accounting. The whole accounting process (from transaction to financial statements preparation) is the main focus of this course.

MAT 3101: Mathematical Methods Of Engineering


MAT 3103: Statistics And Probability

Probability theory, discrete and continuous probability distributions, sampling theory and estimation, test of hypothesis, regression and correlation analysis, analysis of variance, decision making using probabilities, decision trees, application of game theory.

EEE 3101: Digital Electronics

This is core course of Electrical and Electronic Engineering program that presents basic tools for the design of digital circuits. It serves as a building block in many disciplines that utilize data of digital nature like digital control, data communication, digital computers etc. The goal of this course is to: 1) Switching Characteristics of a semiconductor diode and transistor, Cut off, Active and saturation modes. Introduction to Integrated Circuits (ICs). 2) Special characteristics of Digital logic families and their comparative discussion. 3) Definition and Problem solving on Fan out, Noise Margin, Propagation Delay, Speed Power Product 4) Basic Diode Transistor Logic Gates.
Faculty of Engineering
Department of EEE & CoE

BBA 3113: Principles of Economics

The intention of this course is to introduce the students to principles essential to understanding the basic economizing problem and specific economic issues and policy alternatives for dealing with them. Two fortunate outcome of this course are an ability to reason accurately and dispassionately about economic matters and a lasting interest in economics. Topics included are concept

EEE 3102: Digital Electronics Lab

IEEE 3102: Digital Electronics Lab

Laboratory works based on EEE 3101

EEE 3103: Electrical Power Transmission and Distribution

IEEE 3103: Electrical Power Transmission and Distribution

1) Basic concepts of electric power transmission and distribution, Inductance of Transmission Lines: Flux linkage, Inductance due to internal flux, Inductance of single phase two wire lines, Flux linkage of one conductor in a group, Inductance of composite conductor lines. GMD examples; 3-phase lines with symmetrical spacing and unsymmetrical spacing. Parallel circuit 3-phase lines. 2) Potential difference between points due to a charge, capacitance of a two-wire line. Capacitances of 3-phase lines with symmetrical and unsymmetrical spacing. Effect of earth, parallel circuit lines. Resistance and skin effect. 3) Current and voltage relation of different kinds a transmission lines. General line equation in terms of A, B, C, D constants. 4) Transmission line structures, Transmission line construction and maintenance, Environmental impact on transmission lines 5) Mechanical characteristics of transmission line: Sag and tension analysis; effect of temperature, wind and ice loading; supports at different levels. 6) Introduction to Corona, Factors affecting corona, advantages and disadvantages, methods for reducing corona, disruptive voltage and power loss calculations 7) Voltage control in transmission systems. Importance of voltage control, Methods of voltage control, Tap changing Transformers; OFF load and ON load tap changing transformers, Boosting transformers, Synchronous condenser 8) Power Factor Improvement, Disadvantages of low power factor, causes, methods of improvement, calculations of power factor correction 9) Insulators for overhead lines, types of insulators and their construction and performance, Potential distribution in a string of insulators, string efficiency. Methods of equalizing potential distribution; special types of insulators 10) Underground Cables, Underground cables versus overhead lines, construction, insulating materials. Electrostatic stress grading. Three core cables; dielectric losses and heating. 11) Distribution Systems, Substations, Classification of distribution systems, connection schemes, Introduction to substations, different type of substations, Introduction to Flexible Alternating Current Transmission System (FACTS) and High-Voltage, Direct Current (HVDC) electric power transmission system

EEE 3105: Electromagnetic Fields and Waves

IEEE 3105: Electromagnetic Fields and Waves

1) Review of vector analysis, curvilinear orthogonal co-ordinates, Cartesian or rectangular, cylindrical and spherical coordinate, and solutions to static field problems. 2) Electrostatics: Coulomb's law, force, electric field intensity, electrical flux density. Gauss's theorem with application, Electrostatic potential, boundary conditions, method of images, Laplace's and Poisson's equations, energy of an electrostatic system, conductor and dielectrics. 3) Magnetostatics: Concepts of magnetic field, Ampere's law, Biot-Savart law, vector magnetic potential, energy of magnetostatic system, Mechanical forces and torques in Electric and Magnetic fields. 4) Concept of good and perfect conductors and dielectrics. Current distribution in various types of conductors, depth of penetration, internal impedance, power loss, calculation of inductance and capacitance. 5) Time Varying Fields: Maxwell's equations: Their derivatives, continuity of charges, concepts of displacement currents. Boundary conditions for time varying systems. Potentials used with varying charges and currents. Retarded potentials. Maxwell's equations in different coordinate systems. 6) Polarization: Propagation and reflection of electromagnetic waves in unbounded media: plane wave propagation, polarization, power flow and Poynting's theorem. 7) Transmission line analogy, reflection from conducting and dielectric boundary display lines ion in dielectrics, plane wave propagation through the ionosphere. Introduction to radiation.

BBA 3113: Principles of Economics

The intention of this course is to introduce the students to principles essential to understanding the basic economizing problem and specific economic issues and policy alternatives for dealing with them. Two fortunate outcome of this course are an ability to reason accurately and dispassionately about economic matters and a lasting interest in economics. Topics included are concept of demand and supply, elasticity, theory of production, theory of cost, market structure, unemployment, inflation, fiscal and monetary policies.

EEE 3207: Signals and Linear Systems

IEEE 3207: Signals and Linear Systems

This is core course of Electrical and Electronic Engineering program that prepares the student
with basic skills in analyzing signals as well as systems. The goal of this course is to expose the student to: 1) Characteristics, classifications and operations of signals. 2) Characteristics of linear and time-invariant systems. 3) Methods of transient and steady state solution of Differential equations. 4) Methods of transient and steady state solution of Integro-Differential equations. 5) Convolution integral and their applications. 6) Matrix with simple applications in circuit: network function. 7) State equation and state variables for small linear systems. 8) Network theorems and Analogue systems. 9) Fourier series properties and applications. 10) Fourier Transform and its applications to signals and systems 11) Laplace transform and its application to linear circuits.

EEE 3209: Analog Electronics 2

EEE 3209: Analog Electronics 2 This is core course of Electrical and Electronic Engineering program that presents- 1) Review on Feedback Amplifiers and Power Amplifiers: class A, class B, class AB, and class C. 2) Positive feedback and oscillator, RC, LC, and crystal oscillators such as sinusoidal oscillators, phase shift resonant circuit, Colpitt’s and Hartley’s oscillator, Wien Bridge oscillator, twin-T etc.. 3) Modulation: amplitude modulation and demodulation, frequency modulation and demodulation. 4) Introduction to Opto-electronics- LED: structure, principles of operation, characteristic curve; LASER: structure, principles of operation, characteristic curve; Photo-detectors: structure, principles of operation, characteristic curve; Solar-cells: structure, principles of operation, characteristic curve. 5) Introduction to solid state devices - energy band structure in solids, insulators, semiconductors and metals, conductance and semiconductors, electron and holes, density of states and Fermi-Dirac function, calculation of carrier concentration, temperature dependence, carrier generation and recombination etc., 6) MOSFET biasing, region of operations, characteristic curve and equation, small signal and large signal model of MOSFET, MOSFET as an amplifier, common-source amplifier, frequency response, trans-conductance, high frequency model of MOSFET, three band diagram, differential pairs, MOS differential pair, common-mode operation, differential mode operation, mismatch and offset, frequency response of MOS differential pair, MOS capacitance.

EEE 3211: Digital Signal Processing

EEE 3211: Digital Signal Processing This course covers the techniques of modern digital signal processing that are fundamental to a wide variety of application areas. The summarized course description is as follows: 1) Discrete Fourier Transform and Fast Fourier Transform algorithms and applications, Z-transforms. 2) Frequency domain analysis of discrete-time systems. 3) Design and implementation of FIR and IIR filters with Computer-aided design projects. Laboratory works based on taught theory.

EEE 3213: Electrical Machines 2

EEE 3213: Electrical Machines 2 This is a fundamental course for engineering. This course will cover the following topics: 1) Synchronous generator: operating principle, generator types, construction, salient poles and non-salient poles, armature and field cores, armature windings, Y-Δ connection, effect of harmonics, alternator on load, vector diagrams of loaded alternator, voltage regulation, losses and efficiency, Brushless excitation scheme, Synchronization of Alternator, Parallel operation of Alternators and load sharing, synchronizing lamps, synchronizing current, synchronizing power & torque, distribution of load, two reaction analysis of alternators, concept of direct and quadrature axis reactance, determination of voltage regulation of alternators. 2) Stepper Motor: Stepper Motor Principle, Types and Applications, 3) Synchronous motor: characteristic features, operating principle, method of starting, equivalent circuit, power flow, torques, vector diagrams, V-curves, losses, efficiency and starting, power factor correction. 4) Single Phase Induction Motor: Introduction to Single Phase Induction motors, Different types and their Characteristics, Double-field revolving theory of single phase induction motors, starting of single phase IM, and Shaded pole motor. 5) Special Type Motor: Universal Motor, Servo Motor, Permanent-magnet Synchronous motor, hysteresis motor, Reluctance motor, Linear motor, Electrical Machine Design.
EEE 3214: Electrical Machines 2 Lab

EEE 3214: Electrical Machines 2 Lab Laboratory works based on EEE 3214

EEE 3216: Electronics Shop (Electronic Appliances Laboratory)

EEE 3216: Electronics Shop (Electronic Appliances Laboratory) Introduction to various home and consumer electronic appliances. Detailed working principle of a basic radio transmitter and receiver, cathode ray tube (CRT) appliances, LED TV, Household and industrial appliances like microwave oven, washing machine, refrigeration unit, power supplies like uninterruptible power supply (UPS), power banks, battery chargers etc. Identification each tool of a basic tool box for engineers and their uses. PCB design and hardware implementation of an electrical circuit for a particular project work. Practical study of electronic equipment: radio receivers, television receivers, Audio Cassette and CD player, VCR, VCP, DVD player, satellite TV receiver system.

EEE 4000: Project and Thesis

EEE 4000: Project and Thesis Study of problems in the field of Electrical and Electronic Engineering.

EEE 4105: Telecommunications Engineering

EEE 4105: Telecommunications Engineering This is core course of Electrical and Electronic Engineering program that presents basic understanding of Telecommunications Engineering. It serves as a foundation for the students to make them familiarized with all important aspects of Telecommunications Engineering, ranging from the old simple telephony system up to the high tech mobile communications networks while covering microwave and radar technologies, Fiber-optic communication, satellite communication systems etc. The goals of this course are: 1) Introduction to simple telephony and Telecommunication systems, signal spectra, Modulation, Analog modulation: Amplitude modulation and demodulation (DSB-SC, SSB, VSB), Frequency modulation and demodulation (NBFM, WBFM), Phase Modulation (PM), Sampling theorem, Pulse Modulation (PAM, PCM, Quantization, Binary Coding, SONR, Comping, DPCM, Delta Modulation). 2) Introduction to digital signals and modulation techniques (ASK, PSK, FSK, CPFSK, MSK, GMSK and QAM), MODEM, DSL Technology; Overview of Multiplexing, FDM, TDM, Digital and Analog Hierarchy. 3) Introduction to Switching, different types of switching, SPC, time and space switching and digital switching systems (Circuit Switching, Packet Switching). 4) Introduction to teletraffic theory and traffic analysis. 5) Introduction to Optical Fiber communications, LED, Laser, APD, WDM, ATM, SDH, SONET and Digital Exchange. 6) Introduction to cellular mobile communications (Cellular concepts, GSM, CDMA, UMTS) 7) Introduction to radio wave propagation, effects of ionosphere and earth’s curvature, Basics of RADAR and Introduction to Satellite Communication. 8) Introduction to Spectrum Management Issues, Emerging Technologies (WLL, FTTH, ALL IP, IPv6).

EEE 4106: Telecommunications Engineering Lab

EEE 4106: Telecommunications Engineering Lab Laboratory works based on EEE 4105

EEE 4101: Control Systems

EEE 4101: Control Systems This is core course of Electrical and Electronic Engineering program that presents basic tools and methodologies for designing, optimizing, and understanding different control systems. It serves as a building block in many disciplines that utilizes data of analog and digital nature like digital control, data communication, digital computers etc. The goal of this course is to: 1) Introduction to feedback control and terminologies. 2) Types and parts of a control system. Examples of modern control system. 3) Mathematical modeling of physical systems. 4) Block diagram representation and simplification to canonical form by Mason’s rule, time domain specifications, and unit step response. 5) Location of poles and stability by Routh's criterion. Linearization, controllability and observability. 6) Root locus: construction rules, dominant poles, stability, PI, PD and PID state error and static error coefficient. Frequency response: Bode, Nyquist’s Plot, Gain margin, Phase margin. 7) State space representation: formation of state equation, stability. Sampled data systems, digital control system. Introduction to fuzzy control artificial neural network.

EEE 4102: Control Systems Lab

EEE 4102: Control Systems Lab Laboratory works based on EEE 4101.

EEE 4103: Power System Analysis

EEE 4103: Power System Analysis This is core course of Electrical and Electronic Engineering program that presents basic concept about electric power system analysis including both steady state analysis and dynamic analysis of the network components. The course will cover...
the following topics of power system analysis: 1) Representations of Power System Components: Circuit models of power system components, One-Line diagram or Single-Line diagram, Impedance and reactance diagrams, Per Unit system, Change in Base quantities, Advantages and disadvantages of Per Unit computations, Methods of Voltage Control. 2) Load Flow Studies: Node equations and bus impedance matrix, Formation of Ybus matrix by bus inspection, Bus Loading Equation, Implementation of Gauss-Seidel (GS) and Newton-Raphson (NR) iterative methods in load flow study, Advantages and Disadvantages of GS and NR methods. 3) Symmetrical Three phase Faults: Transients on a transmission line due to short circuit, Symmetrical short circuit of a synchronous generator, Selection of Circuit breaker, Concept of short circuit capacity of a bus. 4) Symmetrical Components: Resolution of Unbalanced phasors into Symmetrical components, The 'a' operator, Expression for Phase voltages in terms of Symmetrical components and Symmetrical components in terms of Phase voltages, Complex power in terms of Symmetrical components, Effect of neutral in the system, Relation between sequence components of (phase and line) voltages and currents of star and delta connected systems respectively. 5) Sequence Impedances and sequence networks: Sequence impedance of symmetrical and unsymmetrical circuits, Sequence impedance and network of synchronous generator, transmission line, and transformers. 6) Unsymmetrical faults: Fault calculation of Synchronous generator (unloaded) with and without fault impedance (Single line to ground, Line to Line, Double line to ground faults). 7) Power system stability: Inertia constant M and H of rotating machines, Swing equation and curve, Power angle equation for synchronous machine, Equal area Criterion and its applications, Factors affecting transient stability. 8) Smart Grid: Introduction to Smart Grid, The future of power transmission, What makes the transmission grid smart. Laboratory works based on taught theory.

EEE 4107: Electrical Properties of Materials

EEE 4107: Electrical Properties of Materials This core course familiarizes the student with the properties of metal, ceramic, polymer and composite engineering materials. Methods to protect materials and alter their properties will be investigated. The goal of this course is to: 1) Crystal Structures: Types of crystals, lattice and basis, Bravias lattice and Miller indices. 2) Introduction to Quantum Mechanics: Wave nature of electrons, Schrodinger's equation, one dimensional quantum problems, infinite quantum well, potential step and potential barrier, Heisenberg's uncertainty principle, quantum box. 3) Classical Theory of Electrical and Thermal Conduction: scattering, mobility and resistivity, temperature dependence of resistivity of metals and Mathiessen's rule, Hall effect, thermal conductivity. 4) Band Theory of Solids: Molecular orbital theory, band formation, Bloch theorem, Kronig-Penny model, electron effective mass, density of states. Carrier Statistics: Boltzmann and Fermi-Dirac distribution, Fermi energy. 5) Modern Theory of Metals: Determination of Fermi energy and average energy of metals based on energy band model and Fermi-Dirac distribution functions, classical and quantum mechanical specific heat of electrons in a metal. 6) Dielectric Properties of Materials: Polarization and dielectric constant, electronic, ionic, and orientation polarization, Clausius-Mossotti equation, frequency dependence of dielectric constants, dielectric loss and piezoelectricity. 7) Magnetic Properties of Materials: Magnetic moment, magnetization and relative permittivity, different types of magnetic materials, origin of ferromagnetism and magnetic domains. Introduction to Superconductivity: Zero resistance and Meissner effect, Type-1 and Type-2 superconductor and critical current density.

ENG 2103: Business Communication

ENG 2103: Business Communication This course is designed to help the students in learning the techniques and acquiring the skills needed to communicate effectively in the business world. The course deals with the basic English in the practice to communication in different business situation. Various techniques of communication such as business letters, reports, project proposal and other media form an integral part of the course.

EEE 4211: Microprocessor and I/O System


EEE 4213: Industrial Electronics and Drives

EEE 4213: Industrial Electronics and Drives 1) Introduction to solid state devices: Thyristors, BJT, MOSFET and IGBT; Turning On and turning Off mechanisms, Introduction to triggering devices: UJT, Programmable UJT (PUT), DIAC; Power semiconductor circuits: AC to DC controll-
EEE 4214: Industrial Electronics Lab

EEE 4214: Industrial Electronics Lab

EEE 4215: Power Stations and Substations

EEE 4215: Power Stations and Substations

EEE 4217: VLSI Circuit Design

EEE 4217: VLSI Circuit Design

EEE 4233: Digital Design with System Verilog, VHDL and FPGAs

EEE 4233: Digital Design with System Verilog, VHDL and FPGAs
EEE 4221: Optoelectronic Devices

EEE 4221: Optoelectronic Devices is a core course of Electrical and Electronic Engineering program that introduces final year undergraduate students to the working principles and applications of some main optoelectronic devices. The course covers the following topics:

2. Detailed study of Single/Multimode waveguides, Mode Theory, Step-index/Graded-Index Fibers, Attenuation, Dispersion, Bandwidth, Bit Rate, Absorption and Scattering.

Laboratory works based on taught theory.

EEE 4223: Cellular Mobile Communications

EEE 4223: Cellular Mobile Communications The primary purpose of this course is to teach students the basic of cellular mobile communication. The fundamental concepts of handoff, frequency reuse, trunking efficiency and frequency planning for cellular mobile communications. Basics behind the large scale path loss for mobile radio propagation and different path loss models Basics behind small scale fading, multipath and channel behaviors. Different kinds of modulation and multiple access techniques for cellular mobile communications. Difference between GSM and other types of Cellular Mobile Communication system, GSM Architecture, Functions of MSC, BSC, BTS and other functional blocks (subsystems and parts) of a GSM system. Different types of Channels and Signaling in GSM, Voice and Control channels of a GSM system, Channel Structure and traffic channels, Control Channel and Burst structure, Speech Coding, Channel coding, modulation and power coding in GSM. Situations and Techniques of Handover in GSM, Enhancement of GSM for Data transmission, (GPRS and EDGE).

An introduction to CDMA in mobile communication and CDMA 2000. Brief introductions to 3G and 4G Cellular Mobile Communications Systems. Laboratory works based on taught theory.

EEE 4231: Renewable Energy Technology

EEE 4203: Measurement and Instrumentation

EEE 4203: Measurement and Instrumentation is an Elective course of Electrical and Electronic Engineering program that presents the measurement techniques and associated instruments that are used in various applications. A short description of the course is as follows:

1. Basic requirement for meaningful measurement, significance and methods of measurement, Instruments (mechanical, electrical, electronic), classification of instruments, Null type and deflection (PMMC) type, modes (analog, digital), Functions and applications of instruments.
2. Functional block diagram and generalized measurement system, C-type Burdon type (pressure measurement system), I/O characteristics of measurement system. Desired, modified, interfering inputs. Static and dynamic characteristics, true value, static error, error calibration curve, resolution, sensitivity.
4. AC bridges (Maxwell's inductance bridge, Hay Bridge, Schering Bridge).
5. High voltage measurement and test, Magnetic measurement, Illumination measurement, Analog instruments (indicating, recording and integrating), Electrodynamometer instruments, measurement of energy and industrial metering.
6. Transducers and classifications (strain gauge, pressure transducer, inductive transducer, LVDT, differential transducer, resistive transducer, piezo electric transducer, digital encoder, load cell).
7. Measurements of liquid level (using gamma rays, ultrasonic method, classification of instruments, Null type and deflection (PMMC) type, modes (analog, digital), Functions and applications of instruments.
8. RF measurement techniques and associated instruments that are used in various applications. A short description of the course is as follows:

EEE 4219: Computer System Architecture

EEE 4219: Computer System Architecture is an advanced elective course, offered from the electrical engineering department. This course is a study of the evolution of computer architecture and the factors influencing the design of hardware and software elements of computer systems. The goal of this course is to:

1. Know the difference between computer organization and computer architecture. 2. Understand the computer as a layered system. 3. Learn the components common to every modern computer system. 4. Understand a simple architecture invented to illuminate these basic concepts, and how it relates to some real architecture. 5. Instruction set design 6. Know how the program assembly process works. 7. I/O organization, memory organization, Control unit design. Laboratory works based on taught theory.

EEE 4205: Microwave Engineering


**EEE 4227: Power System Protection**

EEE 4227: Power System Protection This is an elective core course of Electrical and Electronic Engineering program that presents protections systems, mainly different types of circuit breakers and relays for the protection of power system equipments and system itself. 1) HV AC Circuit Breaker: Function, Fault Clearing Process; Trip Circuit; Operating Mechanism; Speed; Auto-reclosure; Trip Free Feature; Switching Phenomena; Rating; Arc Extinction; Type – air, oil, air blast; SF6, vacuum; Testing. 2) LV AC Circuit Breaker: Miniature Circuit Breaker; Metal Clad Circuit Breaker; Fuse and Their Applications. 3) Protective relays: Function of Protective Relaying; Protective Zones; Primary and Back up Protection; General Requirements of Protective Relaying; Actuating Quantities of Relays; Construction and Operating Principle of Various Relays; Use of Instrument Transformers in Relaying. 4) Protection Schemes: Over Current Protection and Relay Coordination; Directional Protection; Earth Fault Protection; Differential Protection; Carrier Current Protection; Distance Protection; Transformer Protection; Motor Protection; Generator Protection and Busbar Protection. Laboratory works based on taught theory.

**EEE 4229: Biomedical Instrumentation, Measurement and Design**

EEE 4229: Biomedical Instrumentation, Measurement and Design This is an elective course of Electrical and Electronic Engineering program which presents an introduction to Biomedical engineering, more specifically Medical electronics and instrumentation (measurement & design). The course outline is designed in a manner that students get a brief introduction to human anatomy and physiology, bioelectric phenomena; so that they understand the circuit and instrumentation realization of biomedical devices. The topics include: 1) Introduction to bio-electromagnetism and Bioelectric Phenomena 2) Membrane potentials of excitable tissue (Neural cells, pacemaker cells, cardiac muscle cells etc.) 3) Introduction to cardiology and ECG (ECG analysis, Lead system, ECG amplifier, ECG noises etc.) 4) Introduction to musculoskeletal muscle system and EMG (EMG amplifier, measurements etc.) 5) Introduction to neural system and EEG (EEG amplifier, lead systems, measurements etc.) 6) Artificial pacemaker, types & operations etc. 7) Introduction to respiratory system and pulmonary diseases, measurements, diagnosis etc. 8) Introduction to circulatory system and measurements etc. 9) Introduction to endocrine system and artificial pancreas. 10) Introduction to medical imaging technology (Ultrasound, X-ray & CT-scan, MRI, PET, SPECT) 11) Introduction to patient safety and monitoring (ICU, CCU) 12) Classification of medical devices, international regulations (CE and FDA approvals). Laboratory works based on taught theory.

**EEE 4225: Electrical and Electronic Services For Buildings**


**EEE 3107: Engineering Ethics**

EEE 3107: Engineering Ethics Technology has a pervasive and profound effect on the contemporary world, and engineers play a central role in all aspects of technological development. To hold paramount, the safety, health, and welfare of the public, engineers must be morally committed and equipped to grapple with ethical dilemmas they confront. This course will provide an introduction to the issues in engineering ethics. It places those issues within a philosophical framework, and it seeks to exhibit their social importance and intellectual challenge. The goal is to stimulate reasoning and to provide the conceptual tools necessary for responsible decision making. Case studies will be utilized throughout as part of the Discussion Topics. Those cases will offer the opportunity for interactive classes.