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News

May 6, 2025 Research Opportunity for StudentsFebruary 4, 2025 UIU students successfully visited the United Power Generation and Distribution Company Limited (UPGDCL) Power Plant in the Dhaka Export Processing Zone (DEPZ)January 28, 2025 Successful Completion of Internship program from United Power Plant.January 27, 2025 Seminar on VLSI, Semiconductor Industry, and Career Opportunities with Ulkasemi Successfully Organized at UIUJanuary 21, 2025 Successful Completion of Seminar on Battery Energy Storage Systems (BESS) View more

Notices

July 21, 2025 Vacancies for Teaching Assistant Summer 2025July 15, 2025 Self- Registration: Summer 2025 TrimesterJuly 13, 2025 Revised Schedule of Project Show (Spring 2025)July 13, 2025 Revised Schedule of Capstone Project Presentations (Spring 2025)June 30, 2025 Advising (Time & Section Selection): Summer 2025 Trimester View more

Events

July 22, 2025 3:00 pm Semiconductor innovation Seminar 22 July 2025April 24, 2025 1:00 pm IEEE PES DAY 2025 at UIUJanuary 19, 2025 2:45 pm Seminar on â€œBESS Solution â€“ For Better Energy Flexibility and Controllability,â€January 21, 2025 2:30 pm ð„ð±ðœð¥ð®¬ð¢ð¯ðž ð'ðžð¦ð§ðšð« ð¨ð§ ð•ð‘ð'ˆ, ð'ðžð¦ð¢ðœð¨ð§ðð®ðœðð¨ð« ðˆð§ðð®ð®¬ð¬ðð«ð², ðšð§ð ð”¥ð¤ðšð¬ðžð¦ð¢ðžJanuary 11, 2025 2:00 pm Seminar on â€œPower Sector Job Opportunities in Bangladesh and Preparation Guidelinesâ€ View more Sequence of Course Offerings in Twelve Trimesters Trimester 1 1. ENG 1011 (English I) * Course Code: ENG 1011 * Credit Hour: 3.0 * Prerequisite:

Reading and Writing: Cohesion, Skimming, Coherence, Scanning; Main ideas, Brainstorming and Taking notes, Comprehensions; Linking and Transitional words; Grammatical Knowledge: Parts of Speech, Punctuation, Subject-Verb Agreement, Preposition, Tense, Article, WH Questions, Paraphrasing; Summarizing; Creative Writing; Presentation. Speaking and Listening: Speaking and Listening strategies; Pronunciation and Intonation; Vocabulary, Educated guess from content; Linking words and Fillers; Introduction to Drama; Performing Play; Art of Questioning; Famous Speeches; Listening Activities; How to make and present a brochure; Impromptu Speaking; Group Presentation. 2. MAT 1101 (Calculus I) * Course Code: MAT 1101 * Credit Hour: 3.0 * Prerequisite:

Function, Domain and Range of a Function, Translation, reflection, compression and stretches of a function. Even and Odd functions, Inverse functions, one to one and many to one function, Family of Exponential, logarithmic, sine and cosine function, Limit, continuity and differentiability, Tangent line, Derivative and Chain rule, An overview of area problem, Newtonâ€™s anti-derivative method in finding area, Indefinite integral, fundamental theorem of calculus, Definite integral, Area between two curves, arc length of plane curves. 3. EEE 1001 (Electrical Circuits I) * Course Code: EEE 1001 * Credit Hour: 3.0 * Prerequisite:

Circuit variables: voltage, current, power and energy, Voltage and current independent and depended sources, Circuit elements resistance, inductance and capacitance. Modeling of practical circuits, Ohmâ€™s law and Kirchhoffâ€™s laws, Solution of simple circuits with both dependent and independent sources, Series-parallel resistance circuits and their equivalents, Voltage and current divider circuits, Delta-Wye equivalent circuits, Techniques of general DC circuit analysis

(containing both independent and dependent sources): Node-voltage method, Mesh-current method, Source transformations. Thevenin and Norton equivalents, Maximum power transfer. Superposition technique. Properties of Inductances and capacitances. Series-parallel combinations of inductances and capacitances; Concepts of transient and steady state response with dc source. Magnetic quantities and variables: Flux, permeability and reluctance, magnetic field strength, magnetic potential, flux density, magnetization curve. Laws in magnetic circuits: Ohmâ€™s law and Ampereâ€™s circuital law. Magnetic circuits: series, parallel and series-parallel circuits. 4. BDS 1201 (History of the Emergence of Bangladesh) * Course Code: BDS 1201 * Credit Hour: 2.0 * Prerequisite:

Partition of British India (1947); Language Movement (1952); Movement for Autonomy; 6-point and 11-Point Programs; The 1970 Election; Speech on 7th of March 1971; Military Action, Genocide in the East Pakistan; The Liberation War; The Emergence of Bangladesh as a Sovereign Independent State in 1971; Constitution of Bangladesh and citizen rights; Culture: Cultural diffusion and change, Bengali culture and problems of society; social problems of Bangladesh; Social change: theories of social change; social change in Bangladesh; urbanization process and its impact on Bangladesh society. Trimester 2 5. ENG 1013 (English II) * Course Code: ENG 1013 * Credit Hour: 3.0 * Prerequisite: ENG 1011

Writing: Free Writing; Guided Writing: Paragraph writing with guidelines (based on hints, Wh questions); Process of Writing; Structure-based Paragraph Writing (types: Descriptive, Narrative and Process); Editing (Identification and correction of mistakes in Articles, Capitalization, Homonym, Fragment, Preposition, Pronoun, Punctuations, Run-on sentences, Faulty parallelism, Spelling, Subject-verb agreement, Tense); Application Writing; Email Writing; Steps of essay writing; Essay Writing in 5 paragraphs: (Cause and Effect essay, Compare and Contrast essay, Argumentative essay); Vocabulary: Sentence making practice on Academic word list (1-10).
Reading: Practice on Reading Comprehensions.
Speaking: Public speaking; Argumentative Presentation.
Listening: Listening practice from various sources. 6. MAT 1103 (Calculus II) * Course Code: MAT 1103 * Credit Hour: 3.0 * Prerequisite: MAT 1101

Differentiations, Lâ€™Hopital Rule, Analysis of functions (increasing, decreasing, Concavity and relative Extrema) and Polynomials, Rolleâ€™s theorem, Mean Value Theorem, Taylorâ€™s series &Maclaurin series, Partial Derivatives, The Chain Rule, Different types of Integration (Principles of Integral evaluation, Integration by parts, Trigonometric Substitution, Integrating rational functions by partial fractions), Improper Integral, Gamma & Beta functions, Multiple integrals and their applications (area, volume problems). 7. EEE 1003 (Electrical Circuits II) * Course Code: EEE 1003 * Credit Hour: 3.0 * Prerequisite: EEE 1001

Definitions of ac voltage, current, power, volt-ampere and various factors (including power, peak, form factors etc.); Introduction to sinusoidal steady state analysis: Sinusoidal sources, phasor, impedance, admittance, reactance, susceptance; voltage, current, power of R, L, C. R-L, R-C, R-L-C circuits with sinusoidal source; Series-parallel and Delta-Wye simplifications of circuits with R, L and C. Techniques of general ac circuit analysis (containing both independent and dependent sources): Node-voltage method, Mesh-current method, Source transformations, Thevenin and Norton Equivalents, Phasor diagrams. Sinusoidal steady state power calculations, RMS values, Real and reactive power. Maximum power transfer, impedance matching. Steady state voltage, current. Circuits with non-sinusoidal excitations, power and power factor of ac circuits with multiple sources of different frequencies; Transients in AC circuits, Resonance in AC circuits: Series and parallel resonance and Q factors. Magnetically coupled circuits. Analysis of three phase circuits: Three phase supply, balanced and unbalanced circuits, power calculation and measurements, Power factor improvement. 8. EEE 1004 (Electrical Circuits Laboratory) * Course Code: EEE 1004 * Credit Hour: 3.0 * Prerequisite: EEE 1001

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 1001 and EEE 1003. In the second part, students will design simple systems using the principles learned in EEE 1001 and EEE 1003. 9. PHY 1101 (Physics I) * Course Code: PHY 1101 * Credit Hour: 3.0 * Prerequisite:

Mechanics: Vectors and vector algebra; Review on particle dynamics; Work, energy, power and momentum; Conservation of linear and angular momentum; Conservation of energy, Elastic and inelastic collisions; Rotational dynamics. Waves & Oscillations: Different types of oscillations; Simple harmonic motion, Damped harmonic motion, Forced harmonic motion and their applications, Energy calculation, Traveling and Stationary waves, Resonance; Sound waves; Application of acoustic phenomena; Wave speed; Power and intensity of travelling wave. Physical Optics: Propagation of light, Reflection and refraction, Theories of light, Interference of light, Superposition principle, Youngâ€™s double slit, Newtonâ€™s ring, Fresnel and Fraunhofer diffractions, Diffraction in different slits and grating, Polarization of light and applications, Brewsterâ€™s Law, Optical activity. Trimester 3 10. EEE 2000 (Simulation Laboratory) * Course Code: EEE 2000 * Credit Hour: 1.0 * Prerequisite: EEE 1003

Introductory simulation laboratory based on using modern simulation software and applying them to basic electrical engineering problems. 11. EEE 2101 (Electronics I) * Course Code: EEE 2101 * Credit Hour: 3.0 * Prerequisite: EEE 1003

Introduction to semiconductors: intrinsic, p-type and n-type. PN junction: formation, and operating principles. PN junction diode: current-voltage characteristics, simplified models,

dynamic resistance and capacitance. Zener diode: current-voltage characteristics and its applications. Diode circuits: Half-wave and full wave rectifiers with filter capacitors, Clippers and clampers, Zener shunt regulator. Metal-Oxide-Semiconductor Field-EffectTransistor (MOSFET): structure, physical operation, current-voltage characteristics and regions of operations, small signal equivalent circuit models; Secondary effects: body effect, channel length modulation, Early effect and short channel effects; MOS amplifiersbiasing discrete and integrated MOS amplifier circuits, Single stage amplifier circuits, their configurations and DC analysis; AC analysis of single stage MOS amplifiers- Voltage and current gain, input and output resistances. MOSFET as active loads, MOSFET as a switch. Bipolar junction transistor (BJT): Basic structure, physical operation, BJT characteristics and regions of operation, DC analysis, biasing the BJT for discrete circuits, small signal equivalent circuit models, AC analysis of Single stage BJT amplifier circuits and their configurations. 12. PHY 1103 (Physics II) * Course Code: PHY 1103 * Credit Hour: 3.0 * Prerequisite: PHY 1101

Electricity magnetism: Concept of charge, Coulombâ€™s law, Electric field, Dipole in an electric field, electric flux, Gaussâ€™ law, electric potential, field potential relation, Capacitance and capacitors with dielectric, energy storage in an electric field, current density, Ohmâ€™s law, EMF, Resistance in series and parallel, Kirchhoffâ€™s Rules, magnetic field, Biot-Savart law, Ampereâ€™s law, Gaussâ€™s law for magnetism, magnetic force on a current, magnetic lines of induction, Faradayâ€™s law, Lenzâ€™s Law, Lorentz Force, Hall effect, Magnetization, Hysteresis, Inductance in series- parallel, DC and AC properties, RMS value, R-L-C resonance, EM waves, Maxwell equations. Heat & Thermodynamics: Review of temperature and heat; Different scales and their relations, Postulates of kinetic theory of gas, Degrees of freedom, Mean free path, laws of thermodynamics, Application of first law in different processes: isothermal and adiabatic changes; Reversible and irreversible processes; Refrigerator, Heat engine and Carnotâ€™s cycle, Efficiency and Coefficient of performance, concept of entropy, thermodynamic relation. Quantum and Modern Physics: Quantum Theory of Radiation, Energy of photons, Photo-electric Effect, Compton Effect, De Broglie wave length, Heisenbergâ€™ s Uncertainty Principle, Phase velocity & Group velocity, Correspondence principle, Pair production, Pair annihilation; Wave function, Quantum numbers, Schrodinger equation-Time dependent and time independent form, Expectation value, Quantum Operator, Eigen functions and Eigen values, Tunneling effect, Energy of trapped electron, Application of Schrodingerâ€™s equation in Hydrogen atom, finite and infinite square well, Quantum dots and corrals, Atomic structures and models, Nuclear physics and radioactivity, Special and general Theory of Relativity and Its Consequences. 13. PHY 1104 (Physics Laboratory) * Course Code: PHY 1104 * Credit Hour: 1.0 * Prerequisite: PHY 1101

Experiments based on Propagation of light, Applications of Interference of light, Applications of Stationary waves, Applications of Simple harmonic motion, Applications of Electricity and magnetism. 14. MAT 2105 (Linear Algebra and Differential Equations) * Course Code: MAT 2105 * Credit Hour: 3.0 * Prerequisite: MAT 1103

Linear Algebra & Matrices: Introduction to the system of linear equations, solutions and their applications. Matrices, Matrix Algebra and Determinants. Solution of equations by matrix inversions. Eigen values and Eigen vectors. Linear combinations, independence of vectors and linear transformations.
Differential Equations: Classification of differential equations. Solutions and applications of first order and second order differential equations by various methods. Wave equation and Heat equation. Solutions with boundary and initial conditions of partial differential equations. Trimester 4 15. EEE 2103 (Electronics II) * Course Code: EEE 2103 * Credit Hour: 3.0 * Prerequisite: EEE 2101

Single-stage MOS amplifiers with passive loads; Single-stage, Cascaded and Cascaded MOS amplifiers with active loads. Frequency response of MOS Amplifiers: Bode plots; Current mirrors, differential amplifiers and Operational Trans conductance Amplifiers (OTA), Single and two stage Operational amplifiers in IC. General-purpose OPAMPs: basics, inverting, non-inverting and adder amplifiers, integrators and differentiators, comparator circuits and other applications. Feedback: basic concept of negative feedback, types of feedback, analysis of voltage-series, current-series, current-shunt and voltage-shunt feedback. Active filters: types and specifications, Bode plots, realization of first, second and higher order low, high, band pass and band reject filters using Opamps. Signal generators: structure and working principle of square-wave, triangular wave and saw-tooth wave generators. Oscillators: structure and working principle of phase-shift oscillators, WienBridge oscillator, LC and crystal oscillators. Output stages and power amplifiers: classification of output stages, class A, B and AB output stages. 16. EEE 2104 (Electronics Laboratory) * Course Code: EEE 2104 * Credit Hour: 1.0 * Prerequisite: EEE 2101

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 2101 and EEE 2103. In the second part, students will design simple projects using the principles learned in EEE 2101 and EEE 2103. 17. CHE 2101 (Chemistry) * Course Code: CHE 2101 * Credit Hour: 3.0 * Prerequisite:

Atomic structure, quantum numbers, electronic configuration, periodic properties of elements and uses of noble gases;

Different chemical bonds and geometry of molecules, Selective organic reactions; Solutions and theory of dilute solution, Phase rule and phase diagram; Thermochemistry, Solid state; photochemistry, Theory of acid-base, buffer solution, pH and indicator concept; Electrochemistry. 18. CHE 2102 (Chemistry Laboratory) * Course Code: CHE 2102 * Credit Hour: 1.0 * Prerequisite:

Experiments based on inorganic quantitative analysis. 19. MAT 2107 (Complex Variables, Fourier and Laplace Transforms) * Course Code: MAT 2107 * Credit Hour: 3.0 * Prerequisite: MAT 1103

Complex Variable: Complex number system. General functions of a complex variable, Limits and continuity of a function of a complex variable and related theorems, Complex differentiation and the Cauchy-Riemann equations. Singularities, Infinite series, Taylorâ€™s and Laurentâ€™s series, Cauchy integral formulae, Cauchyâ€™s residue theorem.
Fourier Analysis: Real and complex forms of Fourier series. Finite transform, Fourier integral, Fourier transforms and their uses in solving boundary value problems.
Laplace Transforms: Laplace and inverse Laplace transforms of functions and their applications (Solution of differential equations). Trimester 5 20. MAT 2109 (Coordinate Geometry and Vector Analysis) * Course Code: MAT 2109 * Credit Hour: 3.0 * Prerequisite: MAT 1103

Conic sections and their properties, Rectangular co-ordinate in 3-space, cross and dot product of vectors, parametric equation of straight lines, Plane in 3-space. Differentiation and integration of vector valued function, tangent and normal vectors, directional derivative and gradient of scalar fields, Tangent planes and normal vectors, vector fields, line integrals, conservative vector field, Greenâ€™s theorem. Triple integral in cylindrical and spherical coordinate systems, Surface integral, flux, divergence theorem, Stokesâ€™ theorem. 21. EEE 2401 (Structured Programming Language) * Course Code: EEE 2401 * Credit Hour: 3.0 * Prerequisite:

Overview, Structure of C program, Data Types and Data Type Qualifier, I/O Functions-Character I/O, Formatted I/O, Character Set, Identifiers, Keywords and Contents, Variables, Expressions, Statement and Symbolic Constants, Arithmetic operators, Relational Operators and Logical Operators, Assignment Operators, Increment/Decrement Operators, Unary Operator and Conditional Operator., Bit-wise Operators, Comma Operator, Precedence and Associativity, Branching: The IF statement (break and continue statement), Branching: SWITCH statement, GOTO statement and operator, Looping: FOR statement (break and continue), Looping: WHILE and DO WHILE statement, Storage class: Automatic, Static, Register and Extern, Functions: Access, Prototype, Argument Passing and Value Receiving, Functions: Pass-by-value, Pass-by-reference and Value Receiving , Functions: Command Line Parameter and Library Functions, Arrays: Initialization, Access, Passing and Receiving, Arrays: 2D handling, Arrays: Sorting and Searching, String Handling, Structure: Initialization, Access, Passing and Receiving, Structure: Embedded Structure, Union and Bit-fields, File: Types of File, Text File Handling, File: Binary File Handling , File: Data File Management Program, Pointer: Concept, Passing and Receiving, Memory Allocation and Release, Pointer: List or Tree Management by Self-Referential Structure, Pointer: Pointer and Multi-Dimensional Arrays, Enumeration, Macros, Pre-Processor and Compiler , Directives, Library, Compiler and Linker, Segment and Memory Model, Video Adapter, Modes and Graphics Initialization, Graphics Functions. 22. EEE 2402 (Structured Programming Language Laboratory) * Course Code: EEE 2402 * Credit Hour: 1.0 * Prerequisite:

Laboratory work based on EEE 2401. 23. GED (GED Optional) * Course Code: * Credit Hour: 3.0 * Prerequisite:

Course Code: BDS 2201
Course Title: Bangladesh Studies
Credit Hour: 3.0
Contact Hour: 3.0
Prerequisite: None Ancient Bengal: Sasanka, Rise of the Palas, the Senas; Early Medieval Bengal; Coming of the Muslims; The Independent sultanate of Bengal: Ilyas Shahi and Hossein Shahi Bengal; Late medieval Bengal: The Establishment of Mughal Rule in Bengal; Bara Bhuiyans: Subedars and Nawabs; The European Style in Bengal Architecture;British rule in Bengal; Battles of Plassey and Buzas; The Dual government; permanent settlement (1793); Nineteenth century Bengali renaissance: social and religious reforms, Raja Rammohan Roy, Ishwar Chandra Vidyasagar, Titu Meer; Partition of Bengal (1905); Language Movement (1952); Movement for Autonomy; 6-point and 11-Point Programs; The 1970 Election-Military Action, Genocide in the East Pakistan; The Liberation War; The Emergence of Bangladesh as a Sovereign Independent State in 1971; Culture: Cultural dilution and change, Bengali culture and problems of society; social problems of Bangladesh; Social change: theories of social change; social change in Bangladesh; urbanization process and its impact on Bangladesh society. **Course Code:** BAN 2501
Course Title: Bangla
Credit Hour: 3.0
Contact Hour: 3.0
Prerequisite: None (à¦…) à¦¬à¦¾à¦‚à¦²à¦¾ à¦‚à¦¾à¦¹à¦¿à¦¤à§à¦¯
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(à¦•) à¦¬à¦¾à¦‚à¦²à¦¾ à¦à¦¾à¦·à¦¾à¦° à¦²à¦¿à¦–à¦¿à¦¤ à¦¦à¦•à§à¦·à¦¤à¦¾: (à§§) à¦¬à¦¾à¦‚à¦²à¦¾ à¦§à§à¦¬à¦¨à¦¿à¦¤à¦¤à§à¦¤à§à¦¬ (à¦§à§à¦¬à¦¨à¦¿, à¦¬à¦°à§à¦£, à¦§à§à¦¬à¦¨à¦¿ à¦ªà¦°à¦¿à¦¬à¦°à§à¦¤à¦¨, à¦¯à§à¦•à§à¦¤à¦¬à¦°à§à¦£), (à§¨) à¦¬à¦¾à¦‚à¦²à¦¾ à¦¬à¦¾à¦¨à¦¾à¦¨: à¦¬à¦¾à¦‚à¦²à¦¾ à¦à¦•à¦¾à¦¡à§‡à¦®à¦¿à¦° à¦¬à¦¾à¦‚à¦²à¦¾ à¦¬à¦¾à¦¨à¦¾à¦¨à§‡à¦° à¦¨à¦¿à§Ÿà¦®, à¦¶à¦¬à§à¦¦à§‡à¦° à¦…à¦ªà¦ªà§à¦°à§Ÿà§‹à¦—, à¦¶à¦¬à§à¦¦à§‡à¦° à¦¬à¦¾à¦¨à¦¾à¦¨ à¦“ à¦…à¦¶à§à¦¦à§à¦§à¦¿, (à§©) à¦¬à¦¾à¦•à§à¦¯à§‡à¦° à¦¶à§à¦¦à§à¦§à¦¿-à¦…à¦¶à§à¦¦à§à¦§à¦¿: à¦¬à¦¾à¦•à§à¦¯à§‡à¦° à¦—à¦ à¦¨à¦—à¦¤ à¦¶à§à¦¦à§à¦§à¦¿-à¦…à¦¶à§à¦¦à§à¦§à¦¿, à¦¬à¦¿à¦°à¦¾à¦® à¦šà¦¿à¦¹à§à¦¨, (à§ª) à¦¬à¦¾à¦‚à¦²à¦¾ à¦²à¦¿à¦–à¦¨ à¦•à§Œà¦¶à¦²: à¦°à§‡à¦œà§à¦²à§‡à¦¶à¦¨ à¦²à¦¿à¦–à¦¨, à¦…à¦¨à§à¦·à§à¦ à¦¾à¦¨ à¦¸à¦žà§à¦šà¦¾à¦²à¦¨ à¦ªà¦¾à¦£à§à¦¡à¦²à¦¿à¦ªà¦¿ à¦ªà§à¦°à¦¸à§à¦¤à§à¦¤, à¦¬à¦¿à¦œà§à¦žà¦¾à¦ªà¦¨ à¦²à¦¿à¦–à¦¨, à¦ªà§à¦°à¦¤à¦¿à¦¬à§‡à¦¦à¦¨à¥¤
(à¦–) à¦¬à¦¾à¦‚à¦²à¦¾ à¦à¦¾à¦·à¦¾à¦° à¦¶à§à¦°à¦¬à¦£ à¦“ à¦•à¦¥à¦¨ à¦¦à¦•à§à¦·à¦¤à¦¾: (à§§) à¦¬à¦¾à¦‚à¦²à¦¾ à¦‰à¦šà§à¦šà¦¾à¦°à¦£à§‡à¦° à¦¨à¦¿à§Ÿà¦®: à¦¸à§à¦¬à¦°à¦¬à¦°à§à¦£ à¦“ à¦¬à§à¦¯à¦¾à¦žà§à¦œà¦¨à¦¬à¦°à§à¦£à§‡à¦° à¦‰à¦šà§à¦šà¦¾à¦°à¦£à§‡à¦° à¦¸à§‚à¦¥à¦¾à¦¨, à¦‰à¦šà§à¦šà¦¾à¦°à¦£à¦°à§€à¦¤à¦¿, (à§¨) à¦¬à¦¾à¦‚à¦²à¦¾ à¦‰à¦šà§à¦šà¦¾à¦°à¦£-à¦¸à¦‚à¦¤à§à¦° à¦“ à¦¤à¦¾à¦° à¦ªà§à¦°à§Ÿà§‹à¦—à¥¤ **Course Code:** ECO 2101
Course Title: Economics
Credit Hour: 3.0
Contact Hour: 3.0
Prerequisite: None Definition of Economics; Economics and engineering; Principles of economics; Micro Economics: Introduction to various economic systems â€“ capitalist, command and mixed economy; Fundamental economic problems and the mechanism through which these problems are solved; Theory of firm. Consumer behavior analysis â€“ Theory of demand and their elasticities, Cardinal and ordinal approaches of utility analysis; Price determination; Nature of an economic theory; Applicability of economic theories to the problems of developing countries; Indifference curve techniques; Producer behavior analysis: Theory of supply and their elasticities, Theory of production, production function, types of productivity; Rational region of production of an engineering firm; Concepts of market and market structure; Cost analysis and cost function; Small scale production and large scale production; Optimization; Theory of distribution; Use of derivative in economics: maximization and minimization of economic functions, relationship among total, marginal and average concepts. Macro-economics: Savings; investment, employment; national income analysis; Inflation; Monetary policy; Fiscal policy and trade policy with reference to Bangladesh. Economics of development and planningâ€”Models for growth and development in the context of Bangladesh. Necessity and Prerequisites for successful planning in Bangladesh. 24. EEE 2301 (Signals and Linear Systems) * Course Code: EEE 2301 * Credit Hour: 3.0 * Prerequisite: EEE 1003 and MAT 2107

Classifications of Signals, Useful Signal Operations, Useful Signal Models, Size of a Signal, Even and Odd Functions, Systems, Classification of systems, System Model. System Response, The Unit Impulse Response, System Response to External Input, System Stability Intuitive Insights into system behavior. Periodic Signal representation by Trigonometric Fourier Series, Existence and Convergence of Fourier Series, Exponential Fourier Series, LTIC System Response to periodic Inputs Generalized Fourier Series. Aperiodic Signal Representation of Fourier Transform, Fourier Transform for some useful functions. Properties of Fourier Transform, Signal Transmission through LTIC system, Signal Energy. Applications of

Fourier Transform. Laplace Transform and Inverse Laplace Transform. Properties of the Laplace Transform Solution to Differential and Integro-Differential Equations Analysis of Electrical Network, System Realization, Frequency Response of LTIC System, Stability of systems. Trimester 6 25. EEE 2200 (Electrical Wiring and Drafting) * Course Code: EEE 2200 * Credit Hour: 1.0 * Prerequisite: EEE 1003

buildings, industrial buildings, multistoried office buildings, multistoried multipurpose buildings, Bangladesh Building Codes and Wiring regulations, IEE Wiring regulations and safety regulations. Basic Symbols and Notations for the creation of Electrical Drawings consistent with BNBC standards and codes, Current Ratings, Legends of conduits, Mounting locations, Demonstration on a simple Architectural Structure. Demonstration on complete drawing of an architectural structure. Fitting and Fixtures layout, Conduit layout (Light loads wiring, Heavy loads wiring) Switchboard connection diagram, Sub-Distribution board connection diagram, Switchboard grouping, Switchboard to SDB connection diagram, Cable TV, Telephone, Internet and Calling Bell wiring. Demonstration on complete drawing for an average sized (2000Sft to 2200Sft) apartment, Load calculation, Selection of wire size, Selection of suitable circuit breakers, Selection of conduit size, Load Sharing method, Main Distribution Board connection diagram, Check Meter to LT panel design, Main system earthing design, Current calculation for Air Conditioner, Motor and Pump. Electricity bill calculation for a residential building, Lightening arrestor selection. Introduction to AutoCAD Software and its applications.
Basic working principle and troubleshooting process of household appliances. Earthing system design. PFI design. Practical Solar PV system Design. Introduction to LAN for a building, Network Device, Network Topologies LAN Components and Technologies, Fire Alarm System, CCTV with layout, Burglar Alarm System, Fire Sprinklers, Working Principle of Elevators(Lift) and Intercom. Fire protection system. Design a Single line diagram of a typical 11KV/415V 500KVA Substation and Bus-bar trucking system for various applications. 26. EEE 2201 (Energy Conversion I) * Course Code: EEE 2201 * Credit Hour: 3.0 * Prerequisite: EEE 1003

Electromechanical energy conversion fundamentals: Faradayâ€™s law of electromagnetic induction, Flemingâ€™s rule and Lenzâ€™s law. Elementary generator: Commutation, electromagnetic force, left hand rule, counter emf and comparison between generator and motor action. Transformer: Ideal transformer â€“ transformation ratio, no-load and load vector diagrams; actual transformer â€“ construction, equivalent circuit, regulation, short circuit and open circuit tests, parallel operation, autotransformer, instrument transformer. Three phase induction motor: Rotating magnetic field, equivalent circuit, vector diagram, torque-speed characteristics, effect of changing rotor resistance and reactance on torque-speed curves, motor torque and developed rotor power, no-load test, blocked rotor test, starting and braking and speed control. Single phase induction motor: Theory of operation, equivalent circuit and starting 27. EEE 2105 (Digital Electronics) * Course Code: EEE 2105 * Credit Hour: 3.0 * Prerequisite: EEE 2101

Number systems and codes. Analysis and synthesis of logic circuits: Boolean algebra, switching functions, switching circuits and combinational logic circuits. Implementation of basic static logic gates in CMOS, noise margin and power dissipation. Modular combinational circuit design: pass transistor, pass gates, multiplexer, demultiplexer and their implementation in CMOS, decoder, encoder, comparators, binary arithmetic elements of ALU design. Programmable logic devices: logic arrays, field programmable logic arrays and programmable read only memory. Sequential circuits: different types of latches, flip-flops and their design using FSM approach, timing analysis of sequential circuits. Modular sequential logic circuit design: shift registers, counters and their applications. Design of combinational and sequential circuit using HDL. 28. EEE 2106 (Digital Electronics Laboratory) * Course Code: EEE 2106 * Credit Hour: 1.0 * Prerequisite: EEE 2101

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 2105. In the second part, students will design simple systems using the principles learned in EEE 2105. 29. EEE 3303 (Probability, Statistics and Random Variables) * Course Code: EEE 3303 * Credit Hour: 3.0 * Prerequisite: EEE 2301

Statistics: Frequency distribution. Mean, median, mode and other measures of central tendency. Standard deviation and other measures of dispersion. Moments, skewness and kurtosis, correlation and regression analysis. Elementary probability theory. Continuous and discrete Random Variables & their moments, Special Probability Distributions. Multiple Random Variables: Joint CDF, Conditional PMF/PDF, Mean & Variance. Functions of Random variables. Introduction to Random Process. Elementary sampling theory & Estimation of parameter: Curve fitting & linear regression. 30. EEE 3107 (Electrical Properties of Materials) * Course Code: EEE 3107 * Credit Hour: 3.0 * Prerequisite: PHY 1103 and MAT 2107

Crystal structures: Types of crystals, lattice and basis, Bravais lattice and Miller indices.
Classical theory of electrical and thermal conduction: Scattering, mobility and resistivity, temperature dependence of metal resistivity, Mathiessenâ€™s rule, Hall effect and thermal conductivity. Introduction to quantum mechanics: Wave nature of electrons, Schrodingerâ€™s equation, one-dimensional quantum problems â€“ infinite quantum well, potential step and potential barrier, quantum wire and quantum dot. Heisenbergâ€™s uncertainty principle. Band theory of solids: Band theory from molecular orbital, effective mass, density-of-states. Carrier statistics: Maxwell-Boltzmann and Fermi-Dirac distributions, Fermi energy. Optical properties of materials: Snellâ€™s law, wave-particle duality of light, total internal reflection, absorption coefficient of materials, complex refractive index, transmission coefficient and reflection coefficient of

materials, Optical transfer matrix method. Dielectric properties of
materials: Dielectric constant, polarization; Clausius-Mosotti equation, frequency
dependence of dielectric constant, dielectric loss and piezoelectricity. Magnetic properties of materials: Magnetic moment, magnetization and relative permittivity, different types of magnetic materials, origin of ferromagnetism and magnetic domains. Introduction to superconductivity: Type I and Type II superconductors. Introduction to meta-materials. Trimester 7 31. ACT 3101 (Financial and Managerial Accounting) * Course Code: ACT 3101 * Credit Hour: 3.0 * Prerequisite:

Financial Accounting: Definition of Accounting, Basic activities of Accounting, Users of Accounting, the need for Basic Accounting for non-business students, Basic and Expanded Accounting Equation, Identifying a transaction, the impact of every transaction on Accounting Equation, Definition of Accounts, Debits and Credits, Steps in a recording process, Preparation of Journal, Ledger and Trial Balance, Accrual and Cash basis Accounting, Different types of Adjusting Entries, Preparation of Adjusting Entries, Different types of Financial Statements, Preparation and interpretation of Income Statement, Ownersâ€™ Equity Statement and Classified Balance Sheet.
Managerial Accounting: The difference between Financial and Managerial Accounting, Importance and purpose of Managerial Accounting, Classification of Costs from five different perspectives using real life cases, Application of High-Low Method in segregating fixed and variable costs, Concept of Cost-Volume-Profit Analysis, Calculation and Interpretation of Break-even and Target Profit Analysis under two different methods, Calculation and Interpretation of Margin of Safety and Degree of Operating Leverage, Concept of Relevant Costs, Characteristics of Relevant Costs, Different types of Decision making: Retain or drop the segment, Make or Buy, Special Order and Sell or Process further. 32. EEE 2203 (Energy Conversion II) * Course Code: EEE 2203 * Credit Hour: 3.0 * Prerequisite: EEE 2201

Synchronous Generator: excitation systems, equivalent circuit, vector diagrams at different loads, factors affecting voltage regulation, synchronous impedance, synchronous impedance method of predicting voltage regulation and its limitations. Parallel operation:
Necessary conditions, synchronizing, circulating current and vector diagram. Synchronous motor: Operation, effect of loading under different excitation condition, effect of changing excitation, V-curves, Permanent Magnet Synchronous Motor. DC generator: Types, no-load voltage characteristics, build-up of a self-excited shunt generator, critical field resistance, load-voltage characteristic, effect of speed on no-load and load characteristics and voltage regulation. DC motor: Torque, counter emf, speed, torque-speed characteristics, starting and speed regulation. 33. EEE 2204 (Energy Conversion Laboratory) * Course Code: EEE 2204 * Credit Hour: 1.0 * Prerequisite: EEE 2201

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 2201 and EEE 2203. In the second part, students will design, implement and verify simple systems using the principles learned in EEE 2201 and EEE 2203. 34. EEE 3309 (Digital Signal Processing) * Course Code: EEE 3309 * Credit Hour: 3.0 * Prerequisite: EEE 2301

Conversion from CT to DT signals, impulse response, finite impulse response (FIR) and
infinite impulse response (IIR) of discrete-time systems, difference equation, convolution, transient and steady state response, Discrete transformations: Discrete Fourier series, discrete-time Fourier series, discrete Fourier transform (DFT) and properties, fast Fourier transform (FFT), inverse fast Fourier transform, Z transformation â€“ properties, transfer function, poles and zeros and inverse Z transform. Digital Filters: FIR filters â€“ linear phase filters, specifications, design using window, optimal and frequency sampling methods; IIR filters â€“ specifications, design using impulse invariant, bi-linear Z transformation. 35. EEE 3310 (Digital Signal Processing Laboratory) * Course Code: EEE 3310 * Credit Hour: 1.0 * Prerequisite: EEE 2301

Selected concepts learned in EEE 3309 will be demonstrated using software tools e.g., Matlab. This course will also include a design project based on the experiments. Trimester 8 36. SOC 3101 (Society, Environment and Engineering Ethics) * Course Code: SOC 3101 * Credit Hour: 3.0 * Prerequisite:

Society: emergence of Sociology as moral lessons for society; Basic institutions in society, organization and institutions in society, Types of Society; Culture: basics of culture, elements of culture, cultural change, socialization, and social issues around us; Technology and society: interaction between technology and society;
Engineering ethics: understanding ethics, engineering ethics; Moral reasoning and engineering as social experimentation; The engineersâ€™ concern for safety, professional responsibility; Employer authority; Rights of engineers; Global issues; Career choice and professional outlook; Ethical problems are like design problems; Genetically modified objects (GMO); Environment: environment and environmental issues environmental degradation, waste management and renewable energy; Basic understanding of sustainable development, SDGs, climate change adaptation; Disability and Accessibility. 37. EEE 3305 (Engineering Electromagnetics) * Course Code: EEE 3305 * Credit Hour: 3.0 * Prerequisite: PHY 1103 and MAT 2109

Basic Laws of Vector Analysis; Orthogonal Coordinate Systems; Transformation between Coordinate Systems, Differential Length, Area and Volume; Line, Surface and Volume Integrals; Gradient, Divergence and Curl of Fields; Laplacian Operator. Coulombâ€™s law and Field intensity, Electric Field due to continuous Charge distributions, Electric Flux Density, Gaussâ€™s Law-Maxwellâ€™s Equation, Application of Gaussâ€™s Law, Electric Potential, Relation between E and V-

Maxwellâ€™s Equations, Electric Dipole, Energy Density in Electrostatic Fields. Continuity Equation and Relaxation Time, Electrostatic Boundary Conditions. Poissonâ€™s and Laplaceâ€™s equations, Capacitance, Method of Images. Biot-Savartâ€™s Law, Ampereâ€™s Circuit Law, Applications of Amperes Circuital Law, Magnetic Flux Density, Maxwellâ€™s equation for Static Fields, Magnetic Scalar and Vector Potentials. Forces due to Magnetic Fields, Magnetic Boundary Conditions, Magnetic Energy.
Faradayâ€™s Law, Displacement Currents, Time Varying Potentials, Time Harmonic Fields. Wave Propagation in Lossy Dielectrics, Plane Wave in Lossless Dielectrics, Plane Waves in Free Space, Plane Wave in Good Conductors. Power and Pointing Vectors, Reflection of a plane Wave at normal incidence. 38. EEE 3307 (Communication Theory) * Course Code: EEE 3307 * Credit Hour: 3.0 * Prerequisite: EEE 2301 and EEE 3303

Review of communication systems and signal distortions and SNR. Amplitude Modulation:
DSB-SC, DSB, SSB and Demodulation, FDM. Frequency Modulation and Phase Modulation: Basic equations, NBFM and NBPM, Wideband FM, Armstrongâ€™s method, Demodulation. Sampling of Continuous time signals and applications including PCM,
DPCM and Delta Modulation and TDM. Basic Digital Modulation including ASK, BPSK and Line Coding techniques. Spread spectrum communications. 39. EEE 3308 (Communication Laboratory) * Course Code: EEE 3308 * Credit Hour: 1.0 * Prerequisite: EEE 2301 and EEE 3303

Selected concepts learned in EEE 3307 will be demonstrated using software tools e.g., Matlab. This course will also include a design project based on the experiments. 40. EEE 3400 (Numerical Techniques Laboratory) * Course Code: EEE 3400 * Credit Hour: 1.0 * Prerequisite: MAT 2105 and EEE 2000

Laboratory on numerical techniques using computer solution of differentiation and integration problems, transcendental equations, linear and non-linear differential equations and partial differential equations. Trimester 9 41. EEE 3205 (Power System) * Course Code: EEE 3205 * Credit Hour: 3.0 * Prerequisite: EEE 2203

Line representation: Equivalent circuit of short, medium and long transmission line. Network representation: Single line and reactance diagram of power system and per unit representation. Load flow: Gauss-Seidel method, Newton Raphson method. Power flow control: Tap changing transformer, phase shifting, booster and regulating transformer and shunt capacitor. Fault analysis: Short circuit current and reactance of a synchronous machine. Symmetrical fault calculation methods: symmetrical components, sequence networks and unsymmetrical fault calculation. Protection: Introduction to relays, differential protection and distance protection. Introduction to circuit breakers. Load curves: Demand factor, diversity factor, load duration curves, energy load curve, load factor, capacity factor and plant factor. 42. EEE 3206 (Power System Laboratory) * Course Code: EEE 3206 * Credit Hour: 1.0 * Prerequisite: EEE 2203

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 3205. In the second part, students will design simple systems using the principles learned in EEE 3205. 43. EEE 3403 (Microprocessor and Interfacing) * Course Code: EEE 3403 * Credit Hour: 3.0 * Prerequisite: EEE 2401 and EEE 2105

Basic components of a computer system. Simple-As-Possible (SAP) computer: SAP-1, selected concepts from SAP-2 and SAP-3 (jump, call, return, stack, push and pop). Evolution of microprocessors. Introduction to Intel 8086 microprocessor: features, architecture, Minimum mode operation of 8086 microprocessor: system timing diagrams of read and write cycles, memory banks, design of decoders for RAM, ROM and PORT. Introduction to Intel 8086 Assembly Language Programming: basic instructions, logic, shift and rotate instructions, addressing modes, stack management and procedures, advanced arithmetic instructions for multiplication and division, instructions for BCD and double precision numbers, introduction to 8086 programming with C language. Hardware Interfacing with Intel 8086 microprocessor: programmable peripheral interface, programmable interrupt controller, programmable timer, serial communication interface, keyboard and display interface (LED, 7 segment, dot matrix and LCD). 44. EEE 3404 (Microprocessor and Interfacing Laboratory) * Course Code: EEE 3404 * Credit Hour: 1.0 * Prerequisite: EEE 2401 and EEE 2105

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts of microprocessor, Architecture, addressing modes, interfacing, instruction sets using assembly language. In the second part, students will perform experiments to verify practically the theories and concepts of micro-controller, interfacing, instruction sets using C programing language to design simple systems. 45. EEE 3207 (Power Electronics) * Course Code: EEE 3207 * Credit Hour: 3.0 * Prerequisite: EEE 2103 and EEE 2203

Power semiconductor switches & triggering devices: BJT, MOSFET, IGBT, SCR, TRIAC,
DIAC, Cool MOS. Rectifiers: AC-DC converter, Uncontrolled & controlled, Single phase & three phase, Full and semi converter. Dual Converter, DC-DC converter, Chopper circuit, SMPS, voltage controllers, DC motor (control) drive, practical drive circuits (i.e. LED driver and others) Inverter: DC-AC converter, Single phase & three phase, voltage & current source, their applications. PWM, AC motor (control) drive, Stepper motor and its drive (control). Application of power electronic devices in industries, power system & automation. HVDC system. 46. EEE 3208 (Power Electronics Laboratory) * Course Code: EEE 3208 * Credit Hour: 1.0 * Prerequisite: EEE 2103 and EEE 2203

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 3207. In the second part, students will design and implement simple systems using the principles learned in EEE 3207. Trimester 10 47. IPE 4101 (Industrial Production Engineering) * Course Code: IPE 4101 * Credit Hour: 3.0 * Prerequisite:

Introduction, evolution, need hierarchy, managers, managerial skills, management functions, management challenges, corporate strategy. Organization: Theory and structure; Coordination; Span of control, Authority delegation; Groups; Manpower planning, Leadership, Wages and incentives. Quality Management & Control : Quality aspects, quality costs, , Evaluation of quality concepts, Quality control, Quality assurance, Basic tools of TQM (Total Quality Management), quality loss functions, TPM (Total productivity management), Lean Manufacturing, 6 sigma productions and Reliability theory. Project Management: Definition, Life cycle, Project selections, Time value of money. Marketing Management: Marketing, Market, Marketing mix, Macro and Micro marketing strategies, Brand, Brand equity, Brand elements, Modern strategy, Laws and regulations. Operation Management: Inventory , ABC analysis, EOQ (Economic order quantity), POQ (Production order quantity), Quantity discount model, Scheduling , sequencing , Priority rules, Demand forecasting, Quantitative models, Qualitative models, technology life cycles, Case studies. Operation Research: Introduction, Evaluation, Optimization, Problem formulation, Linear programming. 48. EEE 4109 (Control System) * Course Code: EEE 4109 * Credit Hour: 3.0 * Prerequisite: EEE 2103 and EEE 2301

Introduction to control system: open & closed loop system. Analysis using transfer function:
Routh stability criterion, transient characteristics, effect of additional pole/zero, steady state
error, parameter sensitivity. Root locus of closed loop system. Design of controller using root locus method. Transfer function of electrical, mechanical & electro-mechanical system. Equivalent system: different types of representations & conversion using block diagram & signal flow graph both in frequency and time domain. State-space representation of system, controller design using state variable. Analysis using frequency response. Introduction to Digital control system, stability analysis in Z-domain. 49. EEE 4110 (Control System Laboratory) * Course Code: EEE 4110 * Credit Hour: 1.0 * Prerequisite: EEE 2103 and EEE 2301

Simulation of system using MATLAB for transient analysis. Hardware realization & analysis of control aspects in both open & closed-loop, uncompensated & compensated system. Design of controllers. Design-based project demonstrating effect of controller. 50. EEE â€¦.. (Elective I Major) * Course Code: * Credit Hour: 3.0 * Prerequisite:

List given bellow. 51. . EEE 4901 (Capstone Project I) * Course Code: EEE 4901 * Credit Hour: 1.0 * Prerequisite: Major declaration

Capstone Project must reflect culminating activities of the student where s/he would showcase knowledge, skills and attitudes learned in the earlier courses. Capstone project represents a culminating demonstration of the program outcomes at the level of solving complex engineering problems. The capstone project involves teams of students who build and test custom designed systems, components or engineering processes. Design projects selected from problems submitted by the students, faculty and local industry; Industry projects are given preference as they are best suited for meeting the course objectives; Instructional phase includes (not limited to): communications, report writing, visual aids, design process (requirements/specifications/objections, synthesis/analysis, design evaluation, implementation, maintainability, manufacturability, economic and social influences etc.), proposal preparation, estimating, project management and scheduling, contracts etc.; Performance phase includes (not limited to): design team formation and organization, design proposals, implementation of design process, project scheduling and management, design reviews, design simulation and testing, preparation of documentation, drawings, specifications, etc., written and oral presentation of completed projects. Trimester 11 52. EEE â€¦.. (Elective I Major) * Course Code: * Credit Hour: 3.0 * Prerequisite:

List given bellow. 53. EEE â€¦.. (Elective II Major) * Course Code: * Credit Hour: 3.0 * Prerequisite:

List given bellow. 54. EEE â€¦.. (Elective II Major Laboratory) * Course Code: * Credit Hour: 3.0 * Prerequisite:

List given bellow. 55. EEE â€¦.. (Elective I Minor) * Course Code: * Credit Hour: 1.0 * Prerequisite:

List given bellow. 56. EEE 4902 (Capstone Project II) * Course Code: EEE 4902 * Credit Hour: 2.0 * Prerequisite: Major declaration

Capstone Project must reflect culminating activities of the student where s/he would showcase knowledge, skills and attitudes learned in the earlier courses. Capstone project represents a culminating demonstration of the program outcomes at the level of solving complex engineering problems. The capstone project involves teams of students who build and test custom designed systems, components or engineering processes. Design projects selected from problems submitted by the students, faculty and local industry; Industry projects are given preference as they are best suited for meeting the course objectives; Instructional phase includes (not limited to): communications, report writing, visual aids, design process (requirements/specifications/objections, synthesis/analysis, design evaluation, implementation, maintainability, manufacturability, economic and social

influences etc.), proposal preparation, estimating, project management and scheduling, contracts etc.; Performance phase includes (not limited to): design team formation and organization, design proposals, implementation of design process, project scheduling and management, design reviews, design simulation and testing, preparation of documentation, drawings, specifications, etc., written and oral presentation of completed projects.

Trimester 12 57. EEE â€¦.. (Elective II Minor) * Course Code: * Credit Hour: 3.0 * Prerequisite:

List given bellow. 58. EEE â€¦.. (Elective II Minor Laboratory) * Course Code: * Credit Hour: 1.0 * Prerequisite:

List given bellow. 59. GED 4000 (Entrepreneurship and Career) * Course Code: GED 4000 * Credit Hour: 3.0 * Prerequisite:

Etiquettes and manners, Building professional ethics and personal integrity; Motivation: Goal settings, core motivation behind goals, creating long-term motivation, skills, habits
and behaviors behind goals, motivating others; Thought and Visionary leadership: vision of
life, goal settings, emotional intelligence, self-confidence, building a consistent routine
towards success; Team Building: Team and teamwork, empathy and sense of belonging, team growth, winning team, team building golden rule; Career and Innovation: Skill assessment, networking, career building in an ethical way, interview techniques, volunteer
works, career guide, developing creative and innovative potential, opportunities and innovation, inspiration from leading entrepreneurs; Entrepreneurship: Entrepreneurial Finance, Law for the Entrepreneur and Manager, Entrepreneurial Marketing, Operations Management, Strategic Management Problem solving: Techniques of problem solving: Problem solving tools and frameworks; Topics related to critical thinking; Topics related to Tender, Letter of Credit (LC) and Draft Project Proposal (DPP) document preparation; CV writings; Communications skills: Public speaking & presentation; Portfolio development. 60. EEE 4903 (Capstone Project III) * Course Code: EEE 4903 * Credit Hour: 3.0 * Prerequisite: Major declaration

Capstone Project must reflect culminating activities of the student where s/he would showcase knowledge, skills and attitudes learned in the earlier courses. Capstone project represents a culminating demonstration of the program outcomes at the level of solving complex engineering problems. The capstone project involves teams of students who build and test custom designed systems, components or engineering processes. Design projects selected from problems submitted by the students, faculty and local industry; Industry projects are given preference as they are best suited for meeting the course objectives; Instructional phase includes (not limited to): communications, report writing, visual aids, design process (requirements/specifications/objections, synthesis/analysis, design evaluation, implementation, maintainability, manufacturability, economic and social influences etc.), proposal preparation, estimating, project management and scheduling, contracts etc.; Performance phase includes (not limited to): design team formation and organization, design proposals, implementation of design process, project scheduling and management, design reviews, design simulation and testing, preparation of documentation, drawings, specifications, etc., written and oral presentation of completed projects. ** EEE 4904 / EEE 4905 (Internship / Industrial Training) * Course Code: EEE 4904 / EEE 4905 * Credit Hour: * Prerequisite:

Course Code: EEE 4904
Course Title: Internship
Credit Hour:
Contact Hour:
Prerequisite: Completion of all credits except EEE 4905 Students undertake a significant experiential learning opportunity, typically with an industrial company that provides electrical services or manufactures electrical products. The internship represents an educational strategy that links classroom learning and student interest with the acquisition of knowledge in an applied work setting. Through direct observation, reflection and evaluation, students gain an understanding of the internship siteâ€™s work, mission, and audience, how these potentially relate to their academic study, as well as the organizationâ€™s position in the broader industry or field. Students will produce a critical reflection on their internship experience demonstrating how they have addressed specific learning goals.
A student must complete all their academic credits and requirements before they embankment into internship program. Students are responsible for securing their own internships but should contact the Career Services Office / the Department Office for assistance and resources to identify and apply for opportunities of interest. Students will participate in an internship for at least three weeks and no less than 120 hours of supervised work. The students work at the industry will be evaluated through the daily journal and a standard rubric marked by the industry supervisor. This evaluation will be complemented by the evaluation of the studentsâ€™ work presented to the internship coordinator in the department.
Course Code: EEE 4905
Course Title: Industrial Training
Credit Hour:
Contact Hour:
Prerequisite: Completion of all credits except EEE 4904 The training aims to exposed students to real electrical

engineering practices in an industry. Students will gain knowledge and working experience as well as improving their interpersonal skills through working with professionals from the industries. Depending on the nature of work in the training, the students will have opportunity to apply theories learnt in the lecture room into real electrical engineering practices. The total duration of the training is at least three weeks and no less than 120 hours of direct training contact hours. List of Elective Courses - Group 1: Electronics Group Elective I 1. Solid State Devices (EEE 4111) * Course Code: EEE 4111 * Credit Hour: 3.0 * Prerequisite:

Semiconductor Fundamentals: General introduction of semiconductors, Energy band model of semiconductors, Carrier properties: charge, effective mass, density of states, The Fermi Function, Equilibrium distribution of carriers, equilibrium carrier concentrations, Carrier Action: Drift, diffusion, recombination-generation, Equations of states â€“ Continuity equations and diffusion equations, diffusion lengths, quasi-Fermi Levels. pn-Junction Diodes: pn junction electrostatics, IV-characteristics, energy-band diagrams for homo and hetero-junctions, transient response. Metal-semiconductor junction: fundamentals, energy band diagrams, Schottky junction and ohmic contacts, Metal-Insulator-Semiconductor junction. Tunnel diodes: fundamentals, energy band diagrams. Bipolar junction transistor: Basic principles of pnp and npn transistors, static characteristics, energy band diagrams for homo and hetero-junction BJTs. Field-effect transistors: Junction FET fundamentals, MOS fundamentals: electrostatics, energy-band diagrams, capacitor-voltage characteristics, effects of non-ideal conditions. Qualitative theory of MOSFET operation, current-voltage characteristics of MOSFETs-output characteristics and transfer characteristics, body effect and channel-length modulation, concept of various performance parameters: output resistance, transconductance, On-off ratio, subthreshold swing, inverse subthreshold slope, drain-induced barrier lowering, Gate Induced Drain Leakage. Short-channel effects and their effects on the MOS performance parameters. Multi-gate MOSFETs: dual-gate, triple gate, FinFET and Gate-all-around structures. Sub-60 mV/dec MOSFETs: negative-capacitance FETs and Tunnel FETs. 2. Semiconductor Processing and Fabrication Technology (EEE 4113) * Course Code: EEE 4113 * Credit Hour: 3.0 * Prerequisite: CHE 2101 and EEE 2103

Substrate materials: Crystal growth and wafer preparation, epitaxial growth technique, molecular beam epitaxy, chemical vapor phase epitaxy and chemical vapor deposition (CVD). Doping techniques: Diffusion and ion implantation. Growth and deposition of dielectric layers: Thermal oxidation, CVD, plasma CVD, sputtering and silicon-nitride growth. Etching: Wet chemical etching, silicon and GaAs etching, anisotropic etching, selective etching, dry physical etching, ion beam etching, sputtering etching and reactive ion etching. Cleaning: Surface cleaning, organic cleaning and RCA cleaning. Lithography: Photo-reactive materials, pattern generation, pattern transfer and metalization. Discrete device fabrication: Diode, transistor, resistor and capacitor. Integrated circuit fabrication: Isolation â€“ pn junction isolation, mesa isolation and oxide isolation. BJT based microcircuits, p-channel and n-channel MOSFETs, complimentary MOSFETs and silicon on insulator devices. Testing, bonding and packaging. 3. Optoelectronics (EEE 4115) * Course Code: EEE 4115 * Credit Hour: 3.0 * Prerequisite: EEE 3107

Optical properties of semiconductors, Direct and indirect band-gap materials, radiative and non-radiative recombination, optical absorption, photo-generated excess carriers, solar irradiance. Solar cells: basic structure, operating principle and energy band diagrams of pn homo-junction, pn hetero-junction, Schottky junction and Metal-Insulator-Semiconductor junction solar cells. Design considerations of Thin film solar cells. Structure, working principle and energy band diagrams of Quantum-well solar cells and organic solar cells. Photo-detectors: junction photo-detectors, PIN detectors, hetero junction detectors, avalanche photodiodes, performance parameters of photo detectors. Photoconductors, and phototransistors. Light emitting diode (LED): Principles, materials for visible and infrared LED, internal and external efficiency, loss mechanism, structure and coupling to optical fibers, hetero junction and quantum well LED. Laser Theory: Spontaneous and Stimulated emission, Einstein relations, light amplification, population inversion, optical feedback and threshold conditions. Semiconductor Lasers: Population inversion in degenerate semiconductors, laser cavity, operating wavelength, threshold current density, power output, optical and electrical confinement, Hetero junction lasers, Introduction to quantum well lasers. 4. Analog Integrated Circuits (EEE 4117) * Course Code: EEE 4117 * Credit Hour: 3.0 * Prerequisite: EEE 2103

MOS single stage amplifiers in integrated circuits: common-source, common-drain, and common-gate amplifiers, active loads, biasing (resistor-MOSFET divider, MOSFET-only voltage divider, self-biased voltage reference), cascode and cascade stages, noise (flicker noise, thermal noise, input-referred noise), small signal analysis, frequency response- Bode plots, DC gain, AC gain, concept of poles and zeroes, their calculation and significance. Current mirrors (basic, cascode), Differential amplifiers: common mode analysis (input and output common mode range), differential amplifier with active load, slew rate. Design of single-stage and two-stage operational amplifiers based on custom specifications. Frequency compensation techniques (feedback), stability, low-frequency open loop gain, output swing, power dissipation, offsets, slew rate, common mode feedback Operational transconductance amplifiers- telescopic, cascoded, folded-cascoded and cascaded structures, unity gain frequency. Noise: Introduction, types, representation in circuits, noise in single stage and differential amplifiers. Band-gap references: Supply voltage independent biasing, temperature independent biasing and constant transconductance biasing. Oscillators: ring type and LC type, Colpitis and Hartley oscillator, Design of LC oscillators. Voltage Controlled Oscillators. Phase Locked Loops (PLL): Introduction, basic PLL (Type I) and charge pumped PLL (Type II). 5. Compound Semiconductor Devices (EEE 4119) * Course Code: EEE 4119 * Credit Hour: 3.0 * Prerequisite: EEE 3107

Reviews of compound semiconductor: Zinc-blend crystal structures, growth techniques, alloys, band gap, basic opto-electronic properties, density of carriers in intrinsic and doped compound semiconductors. Introduction to Physics of Hetero-Junctions: Band alignment, band offset, Andersonâ€™s rule, single and double sided hetero-junctions, quantum wells and quantization effects, lattice mismatch and strain and common hetero-structure material systems. Hetero-Junction diode: Band banding, carrier transport and I-V characteristics. Hetero-junction field effect transistor: Structure and principle, band structure, carrier transport and I-V characteristics. Nonideal effects, frequency response, high electron mobility transistor. Hetero-structure bipolar transistor (HBT): Structure and operating principle, quasi-static analysis, extended Gummel-Poon model, Ebers-Moll model, secondary effects and band diagram of a graded alloy base HBT. Resonant Tunneling diodes: physics and operation. Resonant Tunneling Transistors: device physics, operation and characteristics. Elective II 6. VLSI Design (EEE 4121) * Course Code: EEE 4121 * Credit Hour: 3.0 * Prerequisite: EEE 2401 and EEE 2105

VLSI technology: Top down design approach, technology trends. Review of MOS transistor theory: Threshold voltage, body effect, I-V equations and characteristics, latch-up problems, NMOS inverter, CMOS inverter, pass-transistor and transmission gates. Ratioed circuits: Pseudo NMOS inverter. CMOS circuit characteristics and performance estimation: Resistance, capacitance, rise and fall times, delay, gate transistor sizing and power consumption. Buffer chain design to drive large capacitive load. Electro-migration. Noise margin. Crosstalk. CMOS circuit and logic design: Layout design rules and physical design of simple logic gates. IC fabrication: photolithography, CMOS process flow. Estimation of resistance and capacitance from layout. Layout matching (LVS) Stick diagram and area estimation from stick diagram. CMOS subsystem design: Adders, multiplier, PLA, FSM design. Basic logic gates in CMOS. Synthesis of arbitrary combinational logic in CMOS, pseudo-NMOS, dynamic CMOS and CMOS domino logic. CMOS latches and flip flops. Memory elements design: 6 transistor static CMOS memory cell, 4 transistor dynamic memory cell. 3 transistor and 1 transistor dynamic memory cell. ROM, PROM. Contents Addressable Memory cell. Static CMOS memory array. I/O systems: IO PADs. VLSI Testing: procedure, stuck-at fault, fault coverage, test pattern generation. Scan chain. 7. VLSI Design Laboratory (EEE 4122) * Course Code: EEE 4122 * Credit Hour: 1.0 * Prerequisite: EEE 2401 and EEE 2105

Circuit Design: Schematic, layout, DRC/LVS/RCX. Verification: Functional simulation of Structural/Behavioral/RTL design using Verilog. Synthesis: RTL Verilog to gate-level netlist. Physical Design: gate level netlist to GDSII. 8. Biomedical Electronics (EEE 4123) * Course Code: EEE 4123 * Credit Hour: 3.0 * Prerequisite: EEE 2103

Elements of physiology: central and peripheral nervous system, types of nerves, neuronal conduction, biopotentials. Electrodes and sensors: electrical models, materials, electrode networks, types of sensors. Interface circuits: bio-amplifiers, practical considerations of implementation. Biophysical principles of electrical and magnetic neuromuscular stimulation. Electronic stimulator circuits: neural stimulators for the central nervous system (cochlear, visual, Parkinsonâ€™s, tumors, dystonia, epilepsy, sleep apnea, pain) and the peripheral nervous system (limb movements, urinary system, paralysis, epilepsy and depression, pain) Biotelemetry: Introduction, power and data management telemetry, inductive-link based approach, capacitive-link based approach, optical approach, discrete and integrated circuitries, batteries. 9. Biomedical Electronics Laboratory (EEE 4124) * Course Code: EEE 4124 * Credit Hour: 1.0 * Prerequisite: EEE 2103

Laboratory experiments based on EEE 4123. 10. Electrical Measurements (EEE 4225) * Course Code: EEE 4225 * Credit Hour: 3.0 * Prerequisite: EEE 2203 and EEE 2103

Measuring instruments: Permanent magnet moving coil, moving iron, electrodynamometer and electrostatic type. Ammeter and voltmeter, extension of instrument range. Current and potential transformers. Measurement of power and energy: induction and electrodynamometer type, maximum demand and power factor meter. Electronic measuring equipments. Measurement of resistance, capacitance and inductance. Measurement of conductivity, localization of cable faults. Transducers: strain gauges, thermocouple, resistive Capacitive and inductive transducers, linear variable differential transformer, piezoelectric and optical transducers and their applications. Signal conditioning and data acquisition systems. Error in measurement and their statistical analysis. 11. Electrical Measurements Laboratory (EEE 4226) * Course Code: EEE 4226 * Credit Hour: 1.0 * Prerequisite: EEE 2203 and EEE 2103

Laboratory experiments based on EEE 4225. List of Elective Courses - Group 2: Power Group Elective I 1. Transmission and Distribution Systems (EEE 4211) * Course Code: EEE 4211 * Credit Hour: 3.0 * Prerequisite: EEE 3205

An overview on transmission & distribution system of Bangladesh. Transmission Line: Inductance, Capacitance for single phase & three phase lines. Underground cables: Types, electrostatic stress, grading of cables, Capacitance of single phase and three phase cables. High voltage AC & DC transmission: Advantages & disadvantages of each type of transmission, kinds of dc link. Mechanical design of transmission line: Types of insulators, voltage distribution along string of insulators, string efficiency, methods of equalizing potential; Sag: Sag calculation, effect of ice & wind on sag. Stability: Swing equation, power angle equation, equal area criterion, multi-machine system, step by step solution of swing equation, factors affecting stability, transient stability of synchronous generators, steady-state stability (frequency stability, voltage stability). Flexible AC transmission system (FACTS): Objective of FACTS, basic types of FACTS controllers and devices, Series compensation, Parallel compensation, Distribution automation & control (DAC), sources, effects and mitigation of harmonics in power system. Distribution System: Effect of voltage on transmission efficiency, comparison of various

transmission and distribution systems, Kelvinâ€™s law, method of feeding distribution. 2. Power Plant Engineering (EEE 4213) * Course Code: EEE 4213 * Credit Hour: 3.0 * Prerequisite: EEE 3205

Sources of energy: Fuels, nuclear energy, wind power, solar energy, tidal power. Power plant cycles: Routine cycle, regenerative cycles, gas power cycle, gas turbine cycles and others. Power plants: General layout and principles, Turbines: Steam turbine, gas turbine, combined cycle gas turbine, IC engines, hydro, nuclear and thermal power plant. Power plant instrumentation: Measurement of pressure, temperature, fuel and speed; electrical measurements, instrumentation and controls in steam power stations. Selection of location: Technical, economic and environmental factors, Load forecasting. General scheduling: Deterministic and probabilistic, Electricity tariff: formulation and types. Nuclear power station: Basic components, chain reactions, reactor types (PWR, BWR), shielding, nuclear safety. Nuclear power plant project in Bangladesh. 3. High Voltage Engineering (EEE 4219) * Course Code: EEE 4219 * Credit Hour: 3.0 * Prerequisite: EEE 3205

High voltage DC: Rectifier circuits, voltage multipliers, Van-de-Graf, and electrostatic generators. High voltage AC: Cascaded transformers and Tesla coils. Impulse voltage: shapes, mathematical analysis, codes and standards, single and multi-stage impulse generators, tripping and control of impulse generators. Breakdown in gas, liquid and solid dielectric materials. Corona. High voltage measurements and testing. Over-voltage phenomenon and insulation, lightning and switching surges, basic insulation level, surge diverters and arresters. 4. Advanced Electrical Machines (EEE 4221) * Course Code: EEE 4221 * Credit Hour: 3.0 * Prerequisite: EEE 2203

Special machines: Universal series motor, permanent magnet DC motor, unipolar and bipolar brushless DC motors, stepper motor and control circuits. Reluctance and hysteresis motors with drive circuits, switched reluctance motor, electro static motor, repulsion motor, synchronous and control transformers. Permanent magnet synchronous motors. Acyclic machines: Generators, conduction pump and induction pump. Magneto hydrodynamic generators. Fuel Cells, thermoelectric generators, flywheels. Vector control, linear motors and traction. Photovoltaic systems: stand alone and grid interfaced. Wind turbine generators: induction generator, AC-DC-AC conversion. 5. Renewable Energy (EEE 4223) * Course Code: EEE 4223 * Credit Hour: 3.0 * Prerequisite: EEE 3205

Fundamentals of Energy Systems: reserve and resources, primary and secondary energy, Green House Gases and their effects. Energy Meteorology: The fundamental physics of solar radiation, solar geometry, interaction of solar radiation with the atmosphere, Reasons for wind flow, the coriolis force, the vertical wind profile, solar radiation and wind velocity measurements. Solar Energy: Solar PV: physical processes in solar cells, Modeling of solar cell, solar cell materials, properties of solar cells, influences of different parameters, Formation of PV arrays and modules, components of solar home systems and grid connected PV systems, Maximum power point tracking (MPPT), Modern solar energy applications (residential, electric vehicle, naval, and space, minigrid, nanogrid, net metering). Solar Thermal: The selective surfaces, the working principle of flat plate solar collectors, its important components and its usage. Wind Energy: The power content of flowing wind, wind flow profile, Bernoulliâ€™s equation, air foil, drag and lift force, wind turbine, power curve, Bets Optimum, Different types of generator for wind turbine, Different types of converters for wind energy conversion system. Biomass Energy: Biomass gasifier, biogas digester, bio methenation process, parameters influencing bio methenation process. Different types of biofuels. Hydro Power: The principle of hydro energy conversion, different types of water turbine based upon water head difference. Hydrogen and Fuel Cell: Properties of hydrogen, hydrogen production and storage, wind hydrogen system, working principles of fuel cells. loses, advantages and application of fuel cells, fuel cell types, stacking principles of fuel cells. Other Renewables: Geothermal energy, tidal, wave and sea current energies, the energy content and technologies to extract energy from other renewables. Energy Storage: Properties of energy storage media, types of energy storage technologies, different type of batteries, working principle of Lead-Acid batteries, factors that affect the performance of Lead-Acid batteries. Energy Economics for Renewable Energy. Home Energy Storage System, Grid connected PV system with storage, Grid Connected Hybrid system, Stand-alone Hybrid system, Vehicle to grid, Vehicle to Home. Elective II 6. Operation and Control of Power System (EEE 4215) * Course Code: EEE 4215 * Credit Hour: 3.0 * Prerequisite: EEE 3205

Principles of power system operation: The economic load dispatch (ELD), SCADA: Communication system, remote terminal unit (RTU). Unit commitment, static security analysis, state estimation, optimal power flow, automatic generation control and dynamic security analysis. Frequency regulation and load side management. Need based energy management (NEBM). 7. Operation and Control of Power System Laboratory (EEE 4216) * Course Code: EEE 4216 * Credit Hour: 1.0 * Prerequisite: EEE 3205

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 4215. In the second part, students will design sample systems using the principles learned in EEE 4215. 8. Power System Protection (EEE 4217) * Course Code: EEE 4217 * Credit Hour: 3.0 * Prerequisite: EEE 3205

Purpose of power system protection. Instrument transformers: CTs, PTs, accuracy class of CTs & PTs. Criteria for detecting faults: Over current, differential current, difference of phase angles, over and under voltages, power direction, symmetrical components of current and voltages, impedance, frequency and temperature. Harmonics in power system and power quality. Electromechanical, electronic and digital Relays: Basic modules, over current, differential, distance and directional. Trip circuits. Unit protection schemes: Generator, transformer, motor, bus bar, transmission and distribution

lines. Miniature circuit breakers and fuses. Circuit breakers: Principle of arc extinction, selection criteria and ratings of circuit breakers, types â€“ air, oil, SF6 and vacuum. 9. Power System Protection Laboratory (EEE 4218) * Course Code: EEE 4218 * Credit Hour: 1.0 * Prerequisite: EEE 3205

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 4217. In the second part, students will design sample systems using the principles learned in EEE 4217. 10. Electrical Measurements (EEE 4225) * Course Code: EEE 4225 * Credit Hour: 3.0 * Prerequisite: EEE 2203 and EEE 2103

Measuring instruments: Permanent magnet moving coil, moving iron, electrodynamometer and electrostatic type. Ammeter and voltmeter, extension of instrument range. Current and potential transformers. Measurement of power and energy: induction and electrodynamometer type, maximum demand and power factor meter. Electronic measuring equipments. Measurement of resistance, capacitance and inductance. Measurement of conductivity, localization of cable faults. Transducers: strain gauges, thermocouple, resistive Capacitive and inductive transducers, linear variable differential transformer, piezoelectric and optical transducers and their applications. Signal conditioning and data acquisition systems. Error in measurement and their statistical analysis. 11. Electrical Measurements Laboratory (EEE 4226) * Course Code: EEE 4226 * Credit Hour: 1.0 * Prerequisite: EEE 2203 and EEE 2103

Laboratory experiments based on EEE 4225. List of Elective Courses - Group 3: Communication Group Elective I 1. Optical Fiber Communication (EEE 4313) * Course Code: EEE 4313 * Credit Hour: 3.0 * Prerequisite: EEE 3305 and EEE 3307

Introduction. Light propagation through optical fiber: Ray optics theory and mode theory. Optical fiber: Types and characteristics, transmission characteristics, fiber joints and fiber couplers. Light sources: Light emitting diodes and laser diodes. Detectors: PIN photo-detector and avalanche photo-detectors. Receiver analysis: Direct detection and coherent detection, noise and limitations. Transmission limitations: Chromatic dispersion, nonlinear refraction, four wave mixing and laser phase noises. Optical amplifier: Laser and fiber amplifiers, applications and limitations. Multi-channel optical system: Frequency division multiplexing, wavelength division multiplexing and co-channel interference. 2. Mobile Cellular Communication (EEE 4317) * Course Code: EEE 4317 * Credit Hour: 3.0 * Prerequisite: EEE 3307

Introduction: Evolution of mobile cellular communication (History of wireless communication from pre 1G to 4G). Basic Network architecture (UMTS 3G and 4G), basic call flow diagrams. Cellular communication fundamentals: Hexagonal structure, frequency reuse, channel assignment, interference, Blocking probability, handoff, cell splitting, small cell concept, repeaters and distributed antenna system (DAS). Large scale and small scale propagation models: Free space, ground reflection models, path-loss models (Log-normal model, UMTS models for indoor and outdoor propagation), delay spread, coherence time and bandwidth, Rayleigh fading, level crossing rate and average fade duration. Diversity: Fundamentals of spatial diversity, selection and maximal ration combining received diversity, SNR improvement, transmit diversity, antenna spacing requirement. Modulation and pulse shaping for mobile cellular communication: PSK, FSK and QAM, spectral efficiency and BER performance, adaptive modulation, RC waveforms. CDMA: Fundamentals of spreading and multiple access through spreading codes, Walsh codes, PN codes, transmit power control, basic 3G transmitter and receiver structure, layered architecture and PHY layer channels, HSDPA basics. OFDM: Basic transmitter and receiver structure, LTE basics. 3. Telecommunication Engineering (EEE 4319) * Course Code: EEE 4319 * Credit Hour: 3.0 * Prerequisite: EEE 3307

Introduction: Principle, evolution, networks, exchange and international regulatory bodies. Telephone apparatus. Switching system: Introduction to analog system, digital switching systems â€“ space division switching, blocking probability and multistage switching, time division switching and two dimensional switching. Signaling Techniques, In Channel, Common Channel, SS7 signaling unit, STP, SCP. Call set up procedure. Data communication Architecture, OSI Reference Model, TCP/IP architecture, IP routing. Transmission media for Telecommunication. Traffic analysis: Traffic characterization, grades of service, network blocking probabilities, delay system and queuing. Telephone services and network: Internet telephony and VOIP, integrated services digital network (ISDN), asynchronous transfer mode. Introduction to cellular telephony and satellite communication. 4. Antenna and Propagation (EEE 4321) * Course Code: EEE 4321 * Credit Hour: 3.0 * Prerequisite: EEE 3305

Basics of antenna: Introduction, Radiation pattern, Radiation Power density, Radiation Intensity, Beam width, Directivity, Antenna efficiency, Gain. Friis Transmission equation and Radar Range Equation. Aperture Antennas (Rectangular and Circular). Horn Antennas. Printed and Microstrip Antenna, Antenna Arrays. Propagation of radio waves â€“ broadcast and line of sight, transmission and reception of radio waves, effect of earthâ€™s curvature; long, medium and short wave propagation, ionospheric propagation, scattering in radio links, effect of rain and dust. 5. Satellite Communication (EEE 4323) * Course Code: EEE 4323 * Credit Hour: 3.0 * Prerequisite: EEE 3305 and EEE 3307

Brief history and overview of satellite communications, regulatory bodies, communication systems. Satellite frequency bands, Satellite orbits and launching procedures and look angles. Spacecraft: power, communications, TT&C, antenna systems. Frequency allocations. Fundamental orbital laws. GEO, MEO, LEO satellites, subsystems of a communication satellite, earth station, Link budget analysis, C/N calculation. Modulation and multiplexing techniques for satellite link.

Multiple access techniques: FDMA, TDMA, CDMA, advantage of spectral spreading, satellite jamming. Propagation effects-attenuation, effect of rain on propagation. Satellite Error Control and Coding. Case Studies: Global Positioning System (GPS), VSAT networks, LEO, DBS-TV. 6. Multimedia Communication (EEE 4325) * Course Code: EEE 4325 * Credit Hour: 3.0 * Prerequisite: EEE 3307 and EEE 3309

Some basics on television systems, multidimensional signals and Fourier transform, multidimensional (space-time) sampling, interlaced and non-interlaced scanning: Information theory: conditional and joint entropy and redundancy, source coding theorem, statistical source models, mutual information rate distortion theory: Predictive coding: linear prediction, quantization, optimum predictor; Discrete two-dimensional transforms: DFT, DCT, wavelet and Hadamard transforms; Transform Coding with motion estimation, principles of MPEG coding; Modern audiovisual terminals and communication systems. 7. Advanced DSP and Filter Design (EEE 4327) * Course Code: EEE 4327 * Credit Hour: 3.0 * Prerequisite: EEE 3309

Sampling, interpolation, and decimation; Fast Fourier Transform (FFT), fast convolution by FFT using the overlap-save or overlap-add methods; Bandpass sampling; IIR and FIR filter design and implementation issues: filter structures, coefficient quantization and sensitivity, finite wordlength arithmetic or signal quantization, limit cycles, noise shaping; Spectral estimation methods, Basic adaptive filtering. 8. Telecommunication Policy and Management (EEE 4329) * Course Code: EEE 4329 * Credit Hour: 3.0 * Prerequisite: EEE 3307

International telecommunication organizations, trans-border data flow, barriers to trade in information equipment and services, development of competition, and World Trade Organization telecommunication agreement. Policy problems created by the vulnerability of telecommunication and computer networks to accidental or intentional attacks, dependence of economic and military security on telecommunication networks, information warfare, privacy and surveillance, international trade and information security. Fundamentals of daily telecommunication operations, including human factors in organization, acquisition and procurement, research and development, logistical planning, and relations with carriers and manufacturers. 9. Biomedical Engineering (EEE 4331) * Course Code: EEE 4331 * Credit Hour: 3.0 * Prerequisite: EEE 3309

Human body: Cells and physiological systems. Bioelectricity: genesis and characteristics, structural level of the human body, muscular, skeletal, nervous, cardio-vascular, respiratory systems; Measurement of bio-signals: Measurement systems, transducers, amplifiers and filters, biopotentials (ECG, EEG, EMG and neurostimulation methods), cardiovascular instrumentation (pacemakers, blood pressure, defibrillator, dissolved gas measurement, blood flow measurements, plethysmography, cardiogrpahy & cardioverter), Imaging technology: X-Ray, gamma camera, nuclear magnetic resonance imaging, cerebral angiography, tomography, ultrasound imaging, including doppler ultrasound. 10. Special Topics on Telecommunication Engineering (EEE 4333) * Course Code: EEE 4333 * Credit Hour: 3.0 * Prerequisite: EEE 3307

This course is aimed at covering topics of current interest and new technology of Telecommunication Engineering. 11. Information Theory and Coding (EEE 4335) * Course Code: EEE 4335 * Credit Hour: 3.0 * Prerequisite: EEE 3303 and EEE 3307

Background of Information Theory, Probability, Joint and Marginal Probability, Bayeâ€™s Theorem, DMS, Information Contents, Entropy, Mutual Information, Source Coding, Huffman coding, Noisy Channels: Binary Symmetric Channel, Binary Erasure Channel. Noisy Channel Coding theorem and Capacity.
Coding: Linear block codes, Convolutional codes, Maximum Likelihood decoding and basics of Turbo coding. 12. Introduction to Software Radios (EEE 4339) * Course Code: EEE 4339 * Credit Hour: 3.0 * Prerequisite: EEE 3307

Introduction & Foundational Principles, RF Design for DSP Engineers, Digital Generation of Signals, Analog to Digital Conversion, Equalization and Interference Rejection, Synchronization, Demodulation and Decoding, Real-Time Programming Issues, Case Studies in Software Radio Design. Elective II 13. Microwave Engineering (EEE 4311) * Course Code: EEE 4311 * Credit Hour: 3.0 * Prerequisite: EEE 3305

Transmission lines: Voltage and current in ideal transmission lines, reflection, transmission, standing wave, impedance transformation, Smith chart and impedance matching. Waveguides: general formulation, modes of propagation and losses in parallel plate, rectangular and circular waveguides. Micro strips: Structures and characteristics. Resonators: Waveguide Cavity Resonators, Microstrip Resonators. S-parameters and characterization of RF two-port devices. Power Divider and Coupler, Mixer, Oscillator. Linearity, sensitivity, and dynamic range. Radiation and Antennas: Radiation Resistance, Radiation Pattern- Isotropic, Directional and Omni Directional Patterns, Radiation Power Density, Radiation Intensity, Beamwidth, Directivity, Antenna Efficiency and Gain, Polarization, Hertzian and halfwave dipoles. Mono pole, horn, rhombic and parabolic reflector, array, and Yagi-Uda antenna. 14. Microwave Engineering Laboratory (EEE 4312) * Course Code: EEE 4312 * Credit Hour: 1.0 * Prerequisite: EEE 3305

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 4311. In the second part, students will design simple systems using the principles learned in EEE 4311. 15. Digital Communication (EEE 4315) * Course Code: EEE 4315 * Credit Hour: 3.0 * Prerequisite: EEE 3307

Information Theory fundamentals: Mathematical models of information, entropy, Source coding, Huffman coding and decoding. Digital transmission system: Baseband and bandpass signal representation in terms of basis functions, geometric representation and waveforms of 1D, 2D and multidimensional signals: (PAM, PSK, QAM, FSK), Receiver design in AWGN: (Correlation and matched filter demodulators, maximum likelihood estimation, bit error performance). Digital signal transmission in bandlimited channels: Inter-symbol interference (ISI), Pulse shaping: (Nyquist and Raised Cosine pulse shapes), Linear equalization. Channel coding and capacity: Channel models and capacity, capacity curves, Linear block coding and decoding, Convolutional coding and decoding, Interleaving. Fundamentals of OFDM: Transmitter and receiver, practical parameters in commercial implementation (LTE). 16. Digital Communication Laboratory (EEE 4316) * Course Code: EEE 4316 * Credit Hour: 1.0 * Prerequisite: EEE 3307

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 4315. In the second part, students will design simple systems using the principles learned in EEE 4315. 17. RF Engineering (EEE 4337) * Course Code: EEE 4337 * Credit Hour: 3.0 * Prerequisite: EEE 3307

Introduction to Wireless Components: Antenna, Amplifier, Mixer, Oscillator, Resonant Circuits. Noise: Thermal Noise, Shot Noise, Noise Voltage and Power, Mixing of Noise, Noise Temperature and Noise Figure (NF), NF of Cascaded Components, NF of passive networks. Effects of Nonlinearity: Harmonics, Sensitivity and Dynamic Range, Gain Compression (P1dB), Intermodulation Distortion, Third Order Intercept Point (IP3), IP2, Intercept points of cascaded components. Impedance matching: Smith chart, L-Network, Pi Network Impedance matching. Impedance matching using smith chart. Filter: Filter Design: Maximally Flat, Equal ripple, Linear Phase Filter, Filter Scaling and Transformation. Butterworth, Chebyshev response. Amplifiers and Oscillators: S-Parameter, Power Gain, Stability, Stability Circles, Low Noise Amplifier (LNA) design, Characteristics of Power Amplifier (PA) and amplifier classes. Oscillator Tuning Range, Frequency Stability, Voltage Controlled Oscillator (VCO), Oscillator Phase Noise. Amplifier and Oscillator Design using S-parameters. Mixer: Frequency Conversion, Image Frequency, Conversion Loss, Isolation, Diode Mixer, Image Reject Mixer. 18. RF Engineering Laboratory (EEE 4338) * Course Code: EEE 4338 * Credit Hour: 1.0 * Prerequisite: EEE 3307

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 4337. In the second part, students will design sample systems using the principles learned in EEE 4337. List of Elective Courses - Group 4: Computer Group Elective I 1. Computer Architecture (EEE 4411) * Course Code: EEE 4411 * Credit Hour: 3.0 * Prerequisite: EEE 3403

Information representation; Measuring performance; Limitations of Power consumptions; Instructions and data access methods: operations and operands of computer hardware, representing instruction, addressing styles; Arithmetic Logic Unit (ALU) operations, floating point operations, designing ALU; Processor design: datapaths with single cycle and multi cycle implementations; Control Unit design; Hazards; Exceptions; Pipeline: pipelined datapath and control, superscalar and dynamic pipelining; Memory organization: cache, virtual memory, channels; DMA and Interrupts; Buses; Multiprocessors: types of multiprocessors, performance, single bus multiprocessors, multiprocessors connected by network, clusters. 2. Advanced Logic Design (EEE 4415) * Course Code: CSE 417 * Credit Hour: 3.0 * Prerequisite: EEE 2105

Introduction. Combinational circuit design with programmable logic devices, implementation of high speed multipliers. Design of modular sequential logic circuits, implementation of digital fractional rate multipliers. State machine design, Mealy and Moore machines. Asynchronous circuit design. Design, modeling and verification of complex digital systems. Modem design methodologies for logic design: Data path and control design, algorithmic state machines integration of data and control. Logic circuit testing and testable design. Modern tools for the design and testing of digital systems. Digital design case studies. 3. Multimedia Systems Design (EEE 4419) * Course Code: EEE 4419 * Credit Hour: 3.0 * Prerequisite: EEE 3307 and EEE 3403

Overview to multimedia systems, multimedia storage. Data compression techniques for audio and video. Synchronization. Multimedia networking and protocols, QOS principles. Video streams on ATM. Mobile multimedia computations. Operating system support for multimedia. Hypermedia system. Standard for multimedia. Multimedia database and multimedia applications. Elective II 4. Computer Networks (EEE 4413) * Course Code: EEE 4413 * Credit Hour: 3.0 * Prerequisite: EEE 2401 and EEE 3307

TCP/IP and OSI Reference Models, Internet Protocol Stack, Circuit Switching vs. Packet Switching, FDMA, TDMA Physical Media, Encoding and Decoding, Delay and Packet Loss. Application Layer: Service requirements, WWW, HTTP, Electronic Mail (SMTP), Domain Name System (DNS). Transport Layer: Service Models, Multiplexing/ Demultiplexing, Connectionless Transport (UDP), Connection-oriented Transport (TCP). TCP Flow & Congestion Control. Network Layer: Routing and forwarding, NAT, Fragmentation, Routing algorithms, Routing in the Internet. Link Layer and Local Area Networks: Link layer services, MAC Protocols, Link layer addressing Ethernet, CSMA/CD, ARP. Wireless and Mobile Networks: Wireless links and network characteristics, Wi-Fi: IEEE 802.11 Wireless LANs, CSMA/CA. 5. Computer Networks Laboratory (EEE 4414) * Course Code: EEE 4414 * Credit Hour: 1.0 * Prerequisite: EEE 2401 and EEE 3307

Laboratory works based on EEE 4413. 6. Microprocessor Based System Design (EEE 4417) * Course Code: EEE 4417 * Credit Hour: 3.0 * Prerequisite: EEE 3403

Limitations of 16 bit processors. 32 bit microprocessors (Intel 80386/80486, Motorola 68000) internal architecture, addressing modes, instructions, memory and I/O interfaces, system design, programming, applications to industrial process control. Embedded processors architecture, advanced port, programming, controller design for adjustable speed motor devices. 7. Microprocessor Based System Design Laboratory (EEE 4418) * Course Code: EEE 4418 * Credit Hour: 1.0 * Prerequisite: EEE 3403

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 4417. In the second part, students will design simple systems using the principles learned in EEE 4417. List of Elective Courses - Group 5: Embedded System and Robotics Group Elective I 1. Real Time Embedded System Design (EEE 4513) * Course Code: EEE 4513 * Credit Hour: 3.0 * Prerequisite: EEE 4511

Embedded system courses are divided into two main-streams one is manly SW-oriented and the other is HW oriented. This course is planed focusing the SW part of high level embedded system design. Students who are interested in mainly embedded SW, intelligence, algorithm and real-time system design can take this course as an intro. For the HW part we will have another intro course. After learning this course student will be able to understand real-time operation and control algorithm, embedded OS, how to develop device driver for embedded system based on embedded OS. Can understand and will be able to continue higher studies in application specific embedded system design like communication, signal-processing, power optimization etc. 32-bit MCU intro- ARM architecture, feature, Advanced Programming- real-time system control, multitasking, real-time algorithm, Advanced embedded communications- USB, Ethernet, wireless, CAN, Mod-bus, Embedded OS- Various Tiny-OS, Embedded Linux, Windows CE, and OS for hand-held devices (Android, Symbian etc.) 32-bit MCU intro- ARM architecture, feature, Advanced Programming- real-time system control, multitasking, real-time algorithm, Advanced embedded communications- USB, Ethernet, wireless, CAN, Mod-bus, Embedded OS- Various Tiny-OS, Embedded Linux, Windows CE, and OS for hand-held devices (Android, Symbian etc.) 2. Industrial Automation and Robotics (EEE 4515) * Course Code: EEE 4515 * Credit Hour: 3.0 * Prerequisite: EEE 4511

Embedded system courses are divided into two main-streams one is manly SW-oriented and the other is HW oriented. This course is planed focusing the HW part of high level embedded system design. Students who are interested in mainly embedded HW, industrial automation, robotics and machine drives can take this course as an intro. For the SW part we will have another intro course. After learning this course students will be able to understand and work with various industrial drive and actuators, sensors and transducers. Will be able to understand work with robotic components, hydraulic, pneumatic devices, closed-loop control scheme and can continue higher studies in this field. Industrial drives- DC/AC motor, servo drives, power-electronics interfacing, Sensors and transducers- motion, position, velocity, force, strain etc., Robot as machine-robotic components, kinematical structure and mechanical components, end-efforts (tools and grips), Mechanical drive- Hydraulic and pneumatic system. 3. Real Time Embedded Digital Signal Processing (EEE 4517) * Course Code: EEE 4517 * Credit Hour: 3.0 * Prerequisite: EEE 4511

Embedded system design also involves communication and signal processing application. DSP and FPGA based system design are mainly used in these fields. Students who are interested in other than industrial (machine) control and robotics can take this course to get an exposure in DSP and FPGA based system design. In this course application specific system design will be focused, such as telecommunication, protocol implementation, image-voice-video processing, bio-medical-signal processing etc. This course will use mainly 32-bit DSP-processor to develop system based on RTOS (need course 3) and/or Linux. MPU-Core design using FPGA will also be introduced besides ASIC design. DSP-Processor intro and system development, FPGA based MPU core design, ASIC design. Elective II 4. Embedded System Design and Architecture (EEE 4511) * Course Code: EEE 4511 * Credit Hour: 3.0 * Prerequisite: EEE 3403

This course will teach the new powerful programming technique used for embedded system development. Student will learn to program 8-bit microcontroller using embedded-C. They will be able to solve small to medium scale problem using MCUs. Can input data from the system, process them and can show or use them to control the system. This course will cover 8-bit singleâ€“core general purpose MCU, which will make the course easy, interesting and finally drive them to be interested to learn high level MCUs thus to be aligned with the present trends of embedded system development. MCU introduction- architecture, memory and registers management, built-in peripheral, Introduction to embedded-C and development environment- IDE, variable types, I/O operation, Array and string, Functions, Pointers, IDE, Peripheral programming- I/O port, timer/counter and interrupt programming, Device interfacing- various display devices (LCD, Matrix etc.), input devices, analog sensors interfacing, analog device drive designing and interfacing, High level system introduction- 16/32 bit application specific MCU, advanced feature of embedded-C. 5. Embedded System Design and Architecture Laboratory (EEE 4512) * Course Code: EEE 4512 * Credit Hour: 1.0 * Prerequisite: EEE 3403

Lab experiments will be based on different applications based on the MCU internal peripherals like ports, timer/counter and interrupt module. Display devices interfacing, Digital input device interfacing, Analog sensor interfacing, Analog device control (motor, light etc.).

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