COURSES DESCRIPTION (CATALOG)

Deic 101 Islamic creed and contemporary doctrines 2(2,0,0)
Course Description (catalog): Creed: definition, importance, sources, characteristics, study methodology, pillars of faith, influence of creed on individuals and society, belief nullifiers, thought constraints, Study of some contemporary doctrines: secularism, Satan worshipers, Baha'ism, Zionism, Misoneism, Christian fundamentalism. Student is required to memorize part of the holy Quran. Two one-hour lecture periods per week.

Deic 301 Contemporary Culture Issues 2(2,0,0)
Course Description (catalog): Moderation, Islam globalism and human ties, discrimination and nationalism, Arabic as the medium of education and culture, science and religion, interfaith dialogue, Orientalism and Christianization, Colonialism, Westernization, modernity in literature, Globalization, Terrorism, Development of Moslem nations. Student is required to memorize part of the holy Quran. Two one-hour lecture periods per week.

Deic 317 Islamic Morals and Ethics 2(2,0,0)
Course Description (catalog): Morals (Ethics: definition and foundations, characteristics, study of model samples of the Prophets' morals and ethics, tools of moral/ethical education in Islam. Concept of profession and its importance in human life, constituents of professional morals/ethics and its constraints, model samples of professional morals/ethics in Islam. Student is required to memorize part of the holy Quran. Two one-hour lecture periods per week.

Deic 318 Economic System in Islam 2(2,0,0)
Course Description (catalog): Islamic Economy: (its nature and principles, development, and characteristics), the economic problem and how to face it, contemporary economic systems (capitalism, socialism), economic globalism, World Bank and its goals, World Trade Organization and its goals, ownership in Islam: definition, types, constraints. Islam and economic freedom, Production, distribution, expenditure, economic policies in contracts and transactions. Student is required to memorize part of the holy Quran. Two one-hour lecture periods per week.

Deic 401 Social System in Islam 2(2,0,0)
Course Description (catalog): Society: definition, building blocks of society in Islam, Islamic society attributes, Family in Islam: definition, status, importance, building blocks, marriage and its purposes, spouses' rights, parents, siblings, and relatives' rights, women's status and rights in Islam, Family controversial issues about family system in Islam and responding to those issues (polygamy, inheritance, veil, divorce,…), Family problems and remedies (women's work, alimony, stewardship, …). Student is required to memorize part of the holy Quran. Two one-hour lecture periods per week.

Deic 418 Political System & Human Rights in Islam 2(2,0,0)
Course Description (catalog): Political system: definition, characteristics, State building blocks: homeland, society, authority, goals of state, foundations of state, principles of ruling in Islam, ruler selection, ruler duties, state authority, rights of Moslems and non-Moslems in the Islamic state, Manifestations of implementing the political system in KSA: Governance statute, Shura, judiciary system, security, Hisbah. Human rights in Islam: definition, significance, sources, constraints, Basic rights: (equality, freedom, life, justice, safety), Universal/International Declaration of Human Rights and position of KSA from it, Students are required to memorize part of the holy Quran.

Eng 133 – English Composition I 2 (2,0,0)
Course Description (catalog): This is an intermediate level writing class. Students are guided through the stages of the writing process to write paragraphs that are both meaningful and organized, and include a topic sentence with a controlling idea and conclusion. Students write multi-draft compositions from a variety of practical and academic purposes. They improve their writing by studying model sentences and paragraphs, basic sentence patterns, mechanics, coordinating conjunctions, transitions and vocabulary. Two hours lecture per week.

Eng 134 – English Composition II 2 (2,0,0)
Course Description (catalog): This course develops writing skills from the paragraph level to the level of the essay. It concentrates on the essential form and function of the writing unit (paragraph or essay) in order to prepare the ground for the academic essay. Specific types of composition are practiced: chronological, cause-effect, comparison/contrast and argumentation. In addition, work on paraphrase and summarizing is undertaken, along with back-up work in some specific structure areas. Two hours lecture per week. Prerequisite: Eng 133

Eng 137 – Technical Writing 2(2,0,0)
Course Description (catalog):.This course introduces students to the fundamentals of writing, designing and conveying technical information to different audiences. Students will learn about technical writing conventions, such as organization, style and tone and illustration and layout as they work through the writing process to produce a variety of common technical documents that they will encounter in their academic work. Two hours lecture per week. Prerequisite: Eng 134

Eng 138 – Fundamentals of Speech Communication 2(2,0,0)
Course Description (catalog): A study of communication theories as applied to speech: practical communicative experiences ranging from interpersonal communication and small-group process through problem identification and solution in discussion, to informative and persuasive speaking in standard speaker-audience situations. Two one-hour lecture periods per week. Corequisite: Eng 134

Mgt 292 Management fundamentals & Skills 3(3,0,0)
Course Description (catalog): The course covers Management fundamentals & Skill, such as, Global Management, Change and Innovation, Appendix: Managing Entrepreneurial Ventures, Decision Making, Strategic Management, Module Planning Tools and Techniques, In class discussion: Ethics Dilemma, Operations Management, Marketing Management, E Business, Marketing Plan, Human Resource Management, Team Building, Foundations of Individual Behaviour, Communication. Three one-hour lecture periods per week.

Math 144- Calculus I 4(4,0,0)
Course Description (catalog): This is an introductory course of mathematics for college of engineering students. The course covers the basic concepts and methods of calculus. At the beginning of the course the instructor will provide students the knowledge of the number systems, algebraic operations and functions of single variable with domain and range so that students can learn differentiation of the functions. The main topics to be covered in this course include: Limits, Continuity, Differentiation of functions of a single variable, Exponential, Logarithmic, Trigonometric, Inverse trigonometric functions, Applications of derivatives, Differentials, Curve Sketching, L'Hospital Rule, Mean value theorems, Area and estimating with finite sums, Introduction to integrals and definite integrals. Four one-hour lecture periods per week.

Math 145– Calculus II 4(4,0,0)
Course Description (catalog): This is an intermediate level calculus course designed for undergraduate Engineering students. This course covers mainly the integration and basic principles of Vectors and their applications. At the beginning of this course, the instructor will give the review of differentiation and integration. In depth, the students will learn the methods of integration and vectors. The topic covered include, Techniques of Integration, Improper Integration, Applications of Integration, Infinite Sequences and Series, (Power series and Taylor series), Polar coordinates, Transcendental Functions, Vectors, Vector Valued Functions. Four one-hour lecture periods per week. Prerequisite: Math 144.

Math 215- Math for EE 3(3,0,0)
Course Description (catalog): This course is designed for undergraduate students of electrical engineering. It is an advanced course which covers the principles and methods of Mathematics that are useful to electrical engineering. At the beginning of the course, the Instructor will give a review of complex numbers and their algebra. Complex analysis is then covered in depth, and its application in electrical engineering is emphasized. The remaining topics covered in the course include: System of linear equations; matrices and determinants; Vector Spaces; Linear Transformations; and Eigenvalues and Eigenvectors with strong emphasis on applications to systems of differential equations. Three one-hour lecture periods per week. Prerequisite: Math 145.

Math 240 -Differential Equations 3(3,0,0)
Course Description (catalog): This course is an introductory course of differential equations for college of engineering students. The course covers different methods and concepts to solve first and second order differential equations. At the beginning of the course we discuss some definitions and terminology about differential equations. Then we move to solving first and second order differential equations. The topics in this course include, linear differential equations, solving first order differential equations, solving second order differential equations, series solutions of second order linear differential equations, solving systems of linear differential equations, Laplace transform and its applications in solving differential equations. Three one-hour lecture periods per week. Prerequisite: Math 145.

Math 244 - Multivariate Calculus 3(3,0,0)
Course Description (catalog): This course is an advanced course in calculus, designed for undergraduate students of engineering. The course covers the basic principles and methods of differentiation and integration of two or more variables. At the beginning of the course, the Instructor will give a review of functions of one variable and its differentiation and integration. Then, the functions of two or more variables with domain and range will be discussed. Throughout the course, the following main topics will be covered: solid analytic geometry; vector calculus; partial derivative; and multiple integrals. The coverage will also include relevant and important

applications in the sciences and engineering. Three one-hour lecture periods per week. Prerequisite: Math 145.

Phys 140 – General Physics I **3(3,0,0)**
Course Description (catalog): The course is an introduction to units, measurements, motion in one and two dimensions, kinematics and dynamics, Newton's laws, work and energy, rotational dynamics, linear and angular momentum, torque, and collisions. Basic calculus and multi-variable algebra will be used. Three one-hour lecture periods per week. Corequisite: Math 144.

Phys 141 – General Physics II **3(3,0,0)**
Course Description (catalog): This course introduces students to the physics of electricity and magnetism and the connections between them. The concepts of electric charge, electric field, electric potential, Kirchhoff Law, Gauss Law, electric and magnetic fluxes, capacitance, resistivity and resistance, connections in series and in parallel, RC-circuit, magnetic field, magnetic force, magnetic and electric torques, Ampere Law, electromagnetic induction, and Faraday Law and Lenz Law will be taught. Three one-hour lecture periods per week. Prerequisite: Phys 140

Phys 144 - General Physics I Lab **1 (0,3,0)**
Course Description (catalog): Measure basic constants such as length, weight and time, value of acceleration due to gravity. Design and conduct experiments in mechanics. Analyze and interpret experiment data. Write a scientific report. Draw and interpret a graph. Apply experimental principles and error calculations to mechanics. Three hours lab per week. Corequisite: Phys 140

Phys 145 – General Physics II Lab **1(0,3,0)**
Course Description (catalog): This course introduces students to the basic electrical measurements techniques and to the physics of electricity and magnetism. The concepts of basic measurements, Resistors in series and in parallel, Verifying Ohm's law, Wheatstone Bridge, Verifying Kirchhoff's Laws, Resistivity, Capacitors in series and in parallel, RC circuit, Introduction to Oscilloscope, the Mechanical Equivalent of Heat, the Negative Temperature Coefficient of Resistance (Thermistor), Galvanometer, and the Magnetic Moment will be taught. Three hours lab per week. Corequisite: Phys 141

Chem 140 – General Chemistry I **3(3,0,0)**
Course Description (catalog): Matter properties and measurement, Atoms and the Atomic Theory, Chemical Compounds, Chemical Reactions, Reactions in Aqueous Solutions, Liquids Solids and Intermolecular Forces, Electrons in Atoms, Periodic Table and Atomic Properties, Chemical Bonding, Valence-Bond, Hybridization of Atomic Orbital, Multiple Covalent Bonds, Molecular Orbital Th., Liquids and Solids. Three one-hour lecture periods per week.

Chem 142 – General Chemistry II **3(3,0,0)**
Course Description (catalog): Properties of Gases: Kinetic-molecular theory of gases, Ideal gas law, Mixtures of gases, Thermo- chemistry, Principles of Chemical Equilibrium, Acids and Bases, Buffer Solutions, Neutralization Reactions and Titration Curves, Solubility and Complex-Ion Equilibria, Spontaneous Change: Entropy and Free Energy, Thermodynamic, Solutions and Their Physical Properties, Chemical Kinetics and Electrochemistry. Three one-hour lecture periods per week. Prerequisite: Chem 140

Chem 143 - General Chemistry Lab **1(0,3,0)**
Course Description (catalog): Laboratory safety rules and Evaluation of analytical data, Definition and determination of density, explanation and determination of specific heat, concept of Acids, bases and Heat of Neutralization Reaction and its determination, reversible reactions, concept of equilibrium constant and its determination, Le Chatelier principle and its verification, principle involved in Acid base titrations, indicators, Ionization of electrolytes, determination of dissociation constant of weak acid(Ka), principle involved in complexometric titrations, hardness of water and its determination. Three hours lab per week. Corequisite: Chem 142

CS 204 – Engineering Programming **3(3,0,0)**
Course Description (catalog): Introduction to computer systems; problem solving methodology; testing and debugging of programs; variables, declarations, and assignments; input and output; data types; control flow and looping; functions and overloading; streams and input/output; one-dimensional arrays; two-dimensional arrays; pointers and dynamic arrays; structures; abstract data types and classes; inheritance; friends, overloaded operators, and arrays in classes; recursive functions. Three lectures per week. Projects that will require lab work will be assigned weekly. Three one-hour lecture periods per week. Prerequisite: Math 144.

Engr 100- Introduction to Engineering **1(1,0,0)**
Course Description (catalog): This course introduces engineering to students, particularly those who are interested in an engineering profession. It covers engineering ethics, teamwork, communication skills, engineering topics, and engineering problem solving skills and design methodology. One hour lecture per week.

Engr 105- Engineering Computing Skills **1(2,0,0)**
Course Description (catalog): Problem solving skills and computing using Matlab. Three hours lecture per week. Corequisite: Math 145.

Engr 106– Engineering Graphics **2(1,3,0)**
Course Description (catalog): An introductory course in engineering graphics focuses on graphical communication. Topics include descriptive geometry elements, visualization, engineering drawing techniques, orthographic projection, pictorial representation, section views, and basic dimensioning. The course incorporates computer aided drafting (CAD) with engineering applications using 2-D drawing. This course is divided in to two sections: drafting (sketching) and CAD. The course begins by teaching the basics of engineering graphics using sketching. Freehand sketching using only a pencil and paper is an important skill for any engineer. It is a means of quickly conveying technical information to others. Through sketching the concepts of pictorial projections, section views, auxiliary views and dimensioning are taught. Once the foundation of engineering graphics is known, these concepts can be applied using computer aided design (CAD) software. AutoCAD is a drawing software package used to create two dimensional engineering drawings. Two hours lab/tutorial per week.

Engr 205- Materials Science **3(3,0,0)**
Course Description (catalog): Mechanical, electrical and chemical properties of engineering materials, fundamentals of crystallography, crystal defects, Impurities and imperfections in solids. Atomic diffusion. Single-phase metals and alloys; elastic and plastic deformation, recrystallization and grain growth. Multi-phase materials; phase diagrams and equilibrium microstructural development, Heat treatment process, Studies of the widely used engineering metals, alloys, polymers, composites & ceramics. Three one-hour lecture periods per week. Prerequisite: Chem 142

Engr 223 Engineering Mechanics **3(3,0,0)**
Course Description (catalog): Engineering Mechanics, covering both statics and dynamics. Topics include vector algebra, force systems, free-body diagrams, equilibrium of particles and rigid bodies, kinematics of particles and rigid bodies, Newton's laws applied to particles and rigid bodies, friction. Three one-hour lecture periods per week. Prerequisite: Math 145 & Phys 140.

Engr 303 Thermo Fluids **3 (3,0,0)**
Course Description (catalog): Basic concepts of thermodynamics, properties of pure substances, energy transfer by heat, work, and mass, first and second laws of thermodynamics, basic principles and concepts of fluid mechanics including fluid statics, momentum analysis of flow structures, Bernoulli and energy equations, flow in pipes, basic principles of heat transfer including modes of heat transfer, steady heat transfer. Three one-hour lecture periods per week. Prerequisite: Phys 140 & Chem 142

Engr 307- Engineering Economics **3(3,0,0)**
Course Description (catalog): The course covers the following topics: Engineering Economic Decisions; Understanding Financial Statements; Cost Concepts and Behaviors; Time is Money; Understanding Money and Its Management; Principles of Investing; Present Worth Analysis; Annual Equivalent Worth Analysis; Rate of Return Analysis; Depreciation; Taxes; Break-Even Analysis, Cost Estimation; Developing Project Cash Flows; Inflation; Replacement Decisions. Three one-hour lecture periods per week. Prerequisite: Engr 100

Engr 310- Numerical Methods **3(3,0,0)**
Course Description (catalog): Introduction to Numerical Methods, Solution of Nonlinear Equations, Solution of Simultaneous Linear Algebraic Equations, Solution of Matrix Eigenvalues Problem, Curve Fitting and Interpolation, Numerical Differentiation, Numerical Integration, Ordinary Differential Equations: Initial-Value Problems, Ordinary Differential Equations: Boundary-Value Problems. Three one-hour lecture periods per week. Prerequisite: Math 240 & CS 204

Engr 340 Probability & Statistics for Engineers **3(3,0,0)**
Course Description (catalog): Introduction to Descriptive Statistics; Fundamentals of probability theory; Single and multiple discrete and continuous random variables; Probability density function; Gaussian and other distributions; Joint and conditional probabilities; Moments and statistical averages; Central-limit theorem; Random processes; Stationarity and ergodicity; Correlation function and power-spectral-density; Response of linear systems to random signals. Three one-hour lecture periods per week. Prerequisite: Math 145 and Corequisite: EE 330

Engr 399 Engineering Training **(0 CH)**
Course Description (catalog): All engineering students are required to undergo a comprehensive "Engineering Training Program" with a reputable and specialized industrial firm. The firm can be in or outside Saudi Arabia relevant to his major area of interest in engineering analysis, design, or construction. The main purpose of this summer training is to enhance the

students' practical experience and career abilities. Also, it deepens their engineering knowledge acquired during their academic years in the field of practical experience in real-life engineering projects. Additionally, such a program improves the relationship between the College of Engineering and the governmental and private industrial firms. Also, it can provide the industry with well-trained professionals in the near future. The qualifying student should spend at least eight weeks in a governmental organization, a reputable industrial firm, or a research center that is involved with engineering activities. Two months of full time training. Prerequisite(s): Department Approval

EE 231 Digital Logic Design 3(3,0,0)
Course Description (catalog): Introductory course in Digital logic Design; Boolean algebra; Combinational circuit analysis and design; Sequential circuit analysis and design that includes counters, registers, etc. Introduction to Microprocessors. Software for simulation and design will be used. Three one-hour lecture periods per week. Prerequisite: Math 145. Corequisite: EE 232.

EE 232 Digital Logic Design Lab 1(0,3,0)
Course Description (catalog): Lab experiments for EE 231 that will include combinational and sequential logic. In addition to hardware, circuit simulation software will be used. Three hours lab per week. Corequisite: EE 231.

EE 233 Microprocessors 3(3,0,0)
Course Description (catalog): This course provides a comprehensive introduction to Microcomputer architecture, programming and system design concepts; Design of computer instruction set and CPU; Memory, I/O, and parallel processing; Focus will be on Intel 8086 chip set hardware architecture, and instruction sets. Software will be used in assignments and projects. Three one-hour lecture periods per week. Prerequisite: EE 231 and CS 204. Corequisite EE 234.

EE 234 Microprocessors Lab 1(0,3,0)
Course Description (catalog): Lab experiments for EE 233 that will include the use of hardware and software. Different types of Microprocessors will be used. One three-hour lab per week. Prerequisite: EE 232. Corequisite: EE 233.

EE 241 Electric Circuits I 3(3,0,0)
Course Description (catalog): Linear circuit analysis and design course. Topics include fundamental topics of charge, current, voltage and power; passive circuit elements; mesh and nodal analysis, Thevenin's and Norton's theorems, source transformation; transient analysis in time. Three one-hour lecture periods per week. Corequisite: Math 240 & EE 247.

EE 242 Electric Circuits II 3(2.5,1.5,0)
Course Description (catalog): A continuation of Electric Circuits I. Additional topics includes AC sinusoidal analysis; power calculations; balanced three phase circuits, Laplace Transform, Circuit analysis using Laplace Transform ; passive and active filter analysis and design; Bode diagram, Two port circuits. 5 hours of lecture and 1 three hour lab every 2 weeks**.** Prerequisite: EE 241.

EE 243 Electronics I 3(3,0,0)
Course Description (catalog): Diodes: Models in Circuits, Characteristics, and Applications, Full-Wave rectifiers, Half-Wave rectifiers, Switching; Metal Oxide Field Effect Transistors (MOSFET); Bipolar Junction Transistors (BJT); Models in Circuits, Characteristics, Applications, Biasing, DC Analysis, Small Signal Analysis; Three one-hour lecture periods per week. Three one-hour lecture periods per week. Prerequisite: EE 241. Corequisite: EE 248.

EE 244 Electronics II 3(3,0,0)
Course Description (catalog): Theory and applications of linear integrated circuits. Topics include ideal and real operational amplifiers with applications; Power amplifiers; feedback oscillator circuits; power supplies; voltage regulators; frequency response and compensation; active filters; comparators; waveform generators; Three one-hour lecture periods per week. Prerequisite: EE 243.

EE 247 Electric Circuits Lab 1(0,3,0)
Course Description (catalog): Lab experiments for EE 241 using resistors, inductors, capacitors, function generators, DC supplies Multimeters, and Oscilloscopes. Focus will be on DC inputs. Software circuit simulations will be used. Three hours lab per week. Corequisite: EE 241.

EE 248 Electronic Circuits Lab 1(0,3,0)
Course Description (catalog): Lab experiments for EE 243 using diodes, BJTs and MOSFETs. Software circuit simulations will be used. Three hours lab per week. Prerequisite EE 247, Corequisite: EE 243.

EE 330 Signals and Systems 3(3,0,0)
Course Description (catalog): Course in continuous systems only; signal representations; stability; response due to various inputs. block diagrams; linear and nonlinear systems; Fourier series; Fourier transforms; Laplace transforms; state space; analogue filters. Project and software will be used. Three one-hour lecture periods per week. Prerequisite: Math 215 & Math 240 & EE 242.

EE 331 Engineering Electromagnetism 3(3,0,0)
Course Description (catalog): Vector calculus, Static electric and magnetic fields, solutions to static field problems, Maxwell's equations, electromagnetic waves, boundary conditions; engineering applications. Three one-hour lecture periods per week. Prerequisite: EE 242 & Math 244.

EE 332 Communication Systems Fundamentals 3(3,0,0)
Course Description (catalog): Spectral analysis and signal transmission channel design; amplitude, frequency, phase, and pulse-modulation systems; frequency - division and time -division multiplexes systems; digital communication; noise and its effects in modulation systems. Projects and software will be used. Three one-hour lecture periods per week. Prerequisite: EE 330 & Engr 340. Corequisite EE 333.

EE 333 Communication Systems Fundamentals Lab 1(0,3,0)
Course Description (catalog): Lab experiments for EE 332. It includes experiments on AM, FM, PM, ASK, FSK,PSK, PAM, and PCM communication systems using hardware and software. Three hours lab per week. Prerequisite: EE 248. Corequisite: EE 332.

EE 335 Electric Energy and Power Systems 3(3,0,0)
Course Description (catalog): Mechanical and Electromagnetic Fundamentals ; Three-Phase Circuits; Transformers performance & design; AC Machinery Fundamentals; Synchronous Machines; Parallel Operation of Synchronous Generators; Induction Motors performance & design ; DC Motors; Transmission Lines; Power System Representation and Equations; Introduction to Power-Flow Studies; case study on renewable energy resources, Computer-based projects will be assigned. Three one-hour lecture periods per week. Prerequisite: EE 242. Corequisite: EE 336

EE 336 Electric Energy and Power Systems Lab 1(0,3,0)
Course Description (catalog): Experiments for EE 335. Experiments will cover transformers, DC machines, AC machines, transmission lines, and generation and synchronization. Software and hardware will be used. Three hours lab per week. & Prerequisite: EE 247. Corequisite: EE 335.

EE 429 Mechatronics 3(3,0,0)
Course Description (catalog): The mechatronics course provides the student with a general overview of an integrated electromechanical system, which employs analog and/or digital electronics for sensing, actuation and control. Microprocessor based control systems are given special attention and are covered in detail. An important objective of the course is to demonstrate the integration of measurement systems, control, electronics, programming and mechanics in designing competitive systems. The practical assignments and the project work are designed to enhance planning and team skills. Three one-hour lecture periods per week. Prerequisite: EE 330 and EE 233.

EE 430 Analogue Control Systems 3(3,0,0)
Course Description (catalog): Control systems analysis and design: classical control; transfer functions; time-domain analysis and design; frequency-domain analysis and design; stability analysis; prototyping. Computer projects will be assigned. Three one-hour lecture periods per week. Prerequisite: EE 330.

EE 431 Mechatronics and Controls Lab 1(0,3,0)
Course Description (catalog): General overview of an integrated mechanical-electrical system, which employs analog and/or digital electronics for sensing, actuation and control; Microprocessor- based control systems; measurement systems, control, electronics, programming and mechanics. The practical assignments and the project work are designed to enhance planning and team work skills. One Three-hour lab per week. Prerequisite EE 234. Corequisite: EE 429 & EE 430.

EE 434 Digital Systems and Signal Processing 3(3,0,0)
Course Description (catalog): Course in discrete signals and systems only; signal representations; stability; response due to various inputs; Fourier series; Fourier transforms; FFT, Z transforms; State Space; FIR and IIR Digital filter design. Projects and software will be used. Three one-hour lecture periods per week. Prerequisite: EE 330.

EE 480 Electric Machines 3(2.5,1.5,0)
Course Description (catalog): A continuation of EE 335 and more in-depth treatment of electrical machinery; electromechanical energy conversion; solid understanding and knowledge of the principles of operation of power transformers, DC motors and generators, synchronous machines and induction motors; basic principles of electric machine design. Students will be expected to demonstrate their level of understanding through laboratory work. Three lectures per week and 5 to 6 labs per semester. Prerequisite: EE 335 & EE 336.

EE 481 Power Systems **3(2.5,1.5,0)**
Course Description (catalog): Basic Principles of power Systems; Generator - Transformer Models and the Per Unit System; Transmission Line Parameters; Line Model and Performance; Power Flow Analysis; Optimal Dispatch of Generation; Synchronous Machine Transient Analysis; Balanced Fault; Symmetrical Components and Imbalanced Fault; Stability; Power System Control. Five one hour lectures and one three hour lab every two weeks**.** Prerequisite: EE 335 & EE 336.

EE 482 Power Electronics **3(2.5,1.5,0)**
Course Description (catalog): Power electronics devices analysis, simulation and control; AC to DC converters; DC to DC converters; AC to AC converters; DC to AC converters; DC Drives. 5 one-hour lectures and 1 three-hour lab every 2 weeks. Prerequisites: EE335 and EE 244 & EE 336.

EE 483 Modern Control Systems **3(3,0,0)**
Course Description (catalog): Control system analysis and design: Modern control; state-space equations; time-domain analysis and design; frequency-domain analysis and design; stability analysis; Controllability, Observability, observer design, intro to optimal control and LQR problem. Prerequisite: EE 430.

EE 484 Industrial Controls **3(2.5,1.5,0)**
Course Description (catalog): Programmable Logic Controllers (PLCs), ladder logic programming, advanced PLC operation and related topics. Three one-hour lectures per week and 5 to 6 labs per semester**.** Prerequisite: EE 429 & EE 232.

EE 485 Digital Control Systems **3(2.5,1.5,0)**
Course Description (catalog): Introduction to Discrete-Time Control Systems; The z Transform; z-Plane Analysis of Discrete-Time Systems; Design of Discrete-Time Control Systems by Conventional Methods; State Space Analysis; Pole Placement and Observer Design; Quadratic Optimal Control. Three lectures per week, and 5 to 6 labs per semester.

EE 486 Digital Communication Systems **3(2.5,1.5,0)**
Course Description (catalog): Pulse-Code-Modulation (PCM) and M-ary modulation. Analysis of modulation, demodulation and detection of baseband and band-pass signals. Analysis of the parameters that affects binary signals and M-ary pulse waveforms such as error probability, additive white Gaussian noise (AWGN), inter-symbol interference, and distortion. Comparison between Amplitude, Frequency and Phase Shift-Keying modulations. Analysis of binary encoding formats. Three lectures per week and 5 to 6 labs per semester. Prerequisite: EE 332 & EE 333.

EE 487 Communication Electronics **3(2.5,1.5,0)**
Course Description (catalog): Principles of electronic circuits used in the generation, transmission, and reception of signal waveforms; Nonlinearity and distortion; Review of single-transistor and differential stages; Harmonic, inter-modulation, and cross-modulation distortion; Power amplifier stages; Resonant circuits and transformers; Single-stage and multi-stage RF amplifiers; Neutralization. Impedance matching. Oscillator fundamentals. The Van Der Pol oscillator. Oscillator circuit types. Colpitts oscillators; Crystal oscillators; Relaxation oscillators; Mixers; AM and FM modulators and demodulators; Phase-locked loops. Three lectures per week and 5 to 6 labs per semester**.** Prerequisite: EE 332 & EE 244 & EE 333.

EE 488 Wireless and Cellular Communications **3(2.5,1.5,0)**
Course Description (catalog): Integration of the fundamental concepts of wireless communication systems such as: personal communication systems (PCS), cellular, wireless networks, call processing, frequency reuse, propagation loss, CDMA systems, methods of reducing fades, error correction techniques and multipath. Discussion of multiple access techniques such as: FDMA, TDMA and CDMA. Simulations of different modulation techniques using computer applications. Three lectures per week and 5 to 6 labs per semester. Prerequisite: EE 486 & EE 333.

EE 489 Special Topics **3(3,0,0**
Course Description (catalog): Topics determined by the course instructor in consultation the department chair. Three one-hour lecture periods per week. Prerequisite: Dept. Approval.

EE 490 Undergraduate Research **3(3,0,0)**
Course Description (catalog): Individual research projects for students. Requires prior approval of, and arrangement with, a faculty research advisor. Three one-hour lecture periods per week. Prerequisite: Department Approval.

EE 493 Optical Fiber Communication **3(3,0,0)**
Course Description (catalog): Fundamentals of light. Introduction to optical fibers. Step and graded index fibers, multi-modes and single mode fibers, transmission characteristics of fibers (attenuation, dispersion, polarization). Light sources and detectors, optical amplifiers and modulators. Introduction to photonic networks. Three one-hour lecture periods per week. Prerequisite: EE 331 and EE 243

EE 495 Senior Design I **2(1,0,1)**
Course Description (catalog): This is the first course of a two-semester sequence of senior capstone design. It provides students with experience in the process and practice of electrical component/system design from concept through final design and implementation. Emphasis on teamwork, project management, testing through simulation or prototype and oral and written communications. Prerequisite: 4th year level.

EE 496 Senior Design II **2(1,0,1)**
Course Description (catalog): This is the second course of a two-semester sequence of senior capstone design. It provides students with experience in the process and practice of an electrical component/system design from concept through final design and implementation. Emphasis is on teamwork, project management, testing through simulation or prototype, oral and written communications. Prerequisite: EE 495.

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