EECS1000 EECS First Year Design

[0-3 credit hours]

Orientation to the University, college and departmental facilities, procedures and methodologies available to the student for the academic journey. Introduction to engineering design to EECS freshmen with emphasis on a semester long team-based design project.

EECS1100 Digital Logic Design

[0-4 credit hours]

Number representation and Boolean Algebra. Combinational circuit analysis and design. K-map and tabulation methods. Multiplexers, decoders, adders/subtracters and PLD devices. Sequential circuit analysis and design. Registers, counters and recognizers.

EECS1500 Introduction to Programming

[0-3 credit hours]

Covers the concept and properties of an algorithm, analysis and decomposition of computational problems, use of modern programming practices. Introduction to arrays and classes. Uses the C++ language.

EECS1510 Introduction To Object Oriented Programming

[0-3 credit hours]

Introduces the basics of programming using the Java language. Covers number types, objects, methods, control structures, vectors, files, and inheritance. Utilizes the Java platform to develop GUI interfaces.

EECS2000 Eecs Professional Development

[1 credit hour]

Preparation for entry to the professions of Electrical Engineering and Computer Science and Engineering, including ethics and social responsibilities, employment practices, continuing education and professional registration.

EECS2110 Computer Architecture and Organization

[3 credit hours]

Fundamentals of computer architecture, computer arithmetic, memory systems, interfacing and communication, device subsystems, processor design, cpu organization, assembly programming, performance, distributed models and multiprocessing.

Prerequisites: EECS 1100 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 1500 FOR LEVEL UG WITH MIN. GRADE OF D- OR EECS 1510 FOR LEVEL UG WITH MIN. GRADE OF D-

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EECS2300 Electric Circuits

[0-4 credit hours]

An introduction to electrical circuit components and laws, including ideal op-amps, DC circuit analysis, AC circuit analysis, transient analysis of RL and RC circuits and computer-aided circuit analysis.

Prerequisites: PHYS 2140 FOR LEVEL UG WITH MIN. GRADE OF D- (MAY BE TAKEN CONCURRENTLY)

EECS2340 Electric Circuits For Nonmajors

[3 credit hours]

For students not majoring in EECS. An introduction to electrical circuit components and laws, resistive circuit analysis, AC circuit analysis, phasers, three-phase circuits and computer-aided circuit analysis.

Prerequisites: PHYS 2140 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS2500 Linear Data Structures

[3 credit hours]

This course looks at stacks, queues, and lists as well as the order of algorithms used to access and modify these structures. In addition recursion, hashing, sorting, and set representation are examined in depth.

Prerequisites: EECS 1510 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS2510 Non-Linear Data Structures

[3 credit hours]

The data structures introduced in EECS 1570 are extended to include trees (binary, balanced, and n-ary), graphs, and advanced sorting techniques. In addition, the C++ language is used as the main vehicle and is introduced in the couse. Students are expected to have a strong background in Java prior to this course.

Prerequisites: EECS 2500 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 2520 FOR LEVEL UG WITH MIN. GRADE OF D-

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EECS2520 Discrete Structures

[3 credit hours]

An introduction to the discrete structures used in computer science to develop software including proof techniques, Boolean logic, graphs, trees, recurrence relations and functions.

Prerequisites: PHIL 1010 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS3100 Microsystems Design

[0-4 credit hours]

Microprocessor systems design: basic computer system, CPU, embedded assembly programming, memory and peripheral interfaces, I/O techniques, interrupt structures, DMA, memory management, hierarchies and caches.

Prerequisites: (EECS 2110 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 3400 FOR LEVEL UG WITH MIN. GRADE OF D-)

EECS3150 Data Communications

[3 credit hours]

Analog and digital data transmission, transmission media, Modulation techniques. Data encoding, asynchronous and synchronous transmissions, USART, RS232-C, RS-449 standards. Data link configuration and control, error control, multiplexing and demultiplexing.

Prerequisites: (EECS 1100 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 3210 FOR LEVEL UG WITH MIN. GRADE OF D-)

EECS3210 Signals and Systems

[3 credit hours]

Signal and system representation. Convolution and impulse response. Fourier series, Fourier transform and Laplace transform. Discrete-time systems and Z-transforms. Computer simulation using MATLAB.

Prerequisites: EECS 2300 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 1500 FOR LEVEL UG WITH MIN. GRADE OF D- OR EECS 1510 FOR LEVEL UG WITH MIN. GRADE OF D- AND MATH 2890 FOR LEVEL UG WITH MIN. GRADE OF D- AND MATH 3860 FOR LEVEL UG WITH MIN. GRADE OF D- OR MATH 2860 FOR LEVEL UG WITH MIN. GRADE OF D- OR MATH 3820 FOR LEVEL UG WITH MIN. GRADE OF D-

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EECS3220 Electric Circuits II

[3 credit hours]

Advanced topics including three-phase systems, magnetically-coupled systems, resonance and second-order systems, Laplace transform circuit analysis, Fourier series for periodic waveforms and applications to electric circuits, ideal filters, system modeling and two-port networks.

Prerequisites: EECS 2300 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS3300 Probabilistic Methods In Engineering

[3 credit hours]

Techniques for modeling and analysis of random phenomena in EECS, including communication, control and computer systems. Distribution, density and characteristic functions. Computer generation. Functions of random variables.

Prerequisites: EECS 3210 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS3400 Electronics I

[0-4 credit hours]

Large-signal and incremental characteristics of the pn diode, BJT, MOSFET and JFET. Large- signal analysis and computer simulation of devices and digital circuits. Logic gate implementation. Laboratory experiments and projects.

Prerequisites: EECS 2300 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS3420 Electronics II

[3 credit hours]

Analog transistor, diode and integrated circuit analysis and design. Incremental analysis techniques, frequency response and feedback techniques.

Prerequisites: (EECS 3210 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 3400 FOR LEVEL UG WITH MIN. GRADE OF D-)

EECS3440 Electronics Laboratory

[1 credit hour]

Laboratory experiments and projects in the testing and design of analog and mixed-signal electronic circuits.

Prerequisites: EECS 3420 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS3460 Electrical Energy Conversion

[3 credit hours]

Traditional and renewable electrical energy sources, principles of electromechanical energy conversion, magnetic circuits and transformers, steady state performance of synchronous machines, dc machines, single phase and three phase induction motors.

Prerequisites: EECS 3710 FOR LEVEL UG WITH MIN. GRADE OF D- (MAY BE TAKEN CONCURRENTLY)

EECS3480 Energy Conversion Laboratory

[1 credit hour]

Laboratory studies of power transformers, synchronous machines, DC machines, single and three phase induction motors.

Prerequisites: EECS 3460 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS3540 Systems And Systems Programming

[3 credit hours]

Examines the external and internal characteristics of computer operating systems and related software. Details of at least one operating system and comparison with other operating systems. An introduction to systems level programming.

Prerequisites: EECS 2110 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 2510 FOR LEVEL UG WITH MIN. GRADE OF D-

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EECS3550 Software Engineering

[3 credit hours]

An introduction to the Software Engineering process. Includes: the software lifecycle, user requirements, human-computer interaction, functional specification, software design, software tools, testing and modification. A major term project is assigned.

Prerequisites: EECS 2510 FOR LEVEL UG WITH MIN. GRADE OF D- AND (ENGL 2950 FOR LEVEL UG WITH MIN. GRADE OF D- OR ENGL 2960 FOR LEVEL UG WITH MIN. GRADE OF D- OR HON 1020 FOR LEVEL UG WITH MIN. GRADE OF D-)

EECS3710 Electromagnetics I

[3 credit hours]

The nature of electromagnetism, Complex numbers, Transmission lines, Smith chart, Impedance matching, Vector analysis, Coordinate transformations, Electrostatics, Electrical propeties of materials, Boundary conditions, Magnetostatics, Magnetic properties of materials, Boundary conditions.

Prerequisites: EECS 2300 FOR LEVEL UG WITH MIN. GRADE OF D- AND PHYS 2140 FOR LEVEL UG WITH MIN. GRADE OF D- AND MATH 2860 FOR LEVEL UG WITH MIN. GRADE OF D- OR MATH 3860 FOR LEVEL UG WITH MIN. GRADE OF D- OR MATH 3820 FOR LEVEL UG WITH MIN. GRADE OF D-

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EECS3720 Electromagnetics II

[3 credit hours]

Maxwell's equations, Boundary conditions for electromagnetics, Plane-wave propagation in lossless and lossy media, Reflection, Transmision, Waveguides, Cavity resonators, Radiation, Antenna radiation characteristics, Antennas, Satellite communication systems, Introduction to CAD tools.

Prerequisites: EECS 3710 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS3940 Co-Op Experience

[1 credit hour]

Approved co-op work experience. Course may be repeated.

Prerequisites: EECS 2000 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS3950 Co-Op Experience

[1 credit hour]

Approved co-op work experience beyond third required co-op experience. Course may be repeated.

Prerequisites: EECS 3940 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4000 Senior Design Project

[4 credit hours]

Student teams select and research a design project and propose a design which is implemented, tested and evaluated. Progress reports, a written final report and an oral presentation are required.

Prerequisites: EECS 3100 FOR LEVEL UG WITH MIN. GRADE OF D- OR EECS 3420 FOR LEVEL UG WITH MIN. GRADE OF D-

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EECS4010 Senior Design Project I

[1 credit hour]

Student teams select and research a design project and propose a design. Topics covered include entrepreneurship, business plan, technical communications, design process, design teams, standards, ethics, safety and environment, and intellectual property. A fully developed senior design project proposal is required.

Prerequisites: EECS 3100 FOR LEVEL UG WITH MIN. GRADE OF D- OR EECS 3420 FOR LEVEL UG WITH MIN. GRADE OF D-

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EECS4020 Senior Design Project II

[3 credit hours]

Student teams implement, test and evaluate a design previously proposed in EECS 4010. Written reports on progress and final project are required. Preliminary design and critical design reviews may be performed. Oral presentation and senior design exposition participation are needed.

Prerequisites: EECS 4010 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4100 Theory of Computation

[3 credit hours]

Examines formal models of automata and languages. Finite-state automata, regular languages, pushdown automata, context-free languages, Turing machines, decidability, reducibility, and P vs NP complexity classes.

Prerequisites: EECS 2510 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 2520 FOR LEVEL UG WITH MIN. GRADE OF D-

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EECS4120 Introduction to Fuzzy Systems and Applications

[3 credit hours]

[3 hours] Introduction to Fuzzy Rule Based Intelligent Systems. Basic Concepts of Fuzzy logic, Fuzzy Sets, Fuzzy Arithmetic, Fuzzy Relations, Fuzzy Graphs, Approximate Reasoning and Fuzzy Implications. Applications in Real World Domains. Prerequisite: EECS 2110.

Prerequisites: EECS 2110 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4130 Digital Design

[4 credit hours]

The design of digital systems, design methodologies, hardware description language such as VHDL: behavioral-, data flow- and structural-level description of digital systems. Implementation technologies including PLDs and FPGAs.

Prerequisites: EECS 2110 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4170 Real-Time Embedded Systems Design

[3 credit hours]

Programming applications in a real-time environment. C language is used to program various microcontroller functions, including timers, A/D and D/A converters, RS-232 communication and CAN networking.

Prerequisites: EECS 3100 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4200 Feedback Control Systems

[3 credit hours]

Feedback methods for the control of dynamic systems. Topics include characteristics and performance of feedback systems, state variable analysis, stability, root locus and frequency response methods and computer simulation.

Prerequisites: EECS 3220 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4220 Programmable Logic Controllers

[3 credit hours]

An introduction to programmable logic controllers (PLCs), process control algorithms, interfacing of sensors and other I/O devices, simulation and networking.

Prerequisites: (EECS 1100 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 3210 FOR LEVEL UG WITH MIN. GRADE OF D-)

EECS4240 Power Systems Operation

[3 credit hours]

Single line diagrams and per unit calculations, network matrices and Y-bus, load flow techniques, large system loss formula, real and reactive power dispatch, power system relays and protection.

Prerequisites: EECS 3460 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4260 Control Systems Design

[3 credit hours]

A general study of computer-aided design of control systems. Topics include: stability, compensation, pole placement, nonlinear systems and digital systems.

Prerequisites: EECS 4200 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4330 Image Analysis And Computer Vision

[3 credit hours]

Imaging geometry, image filtering, segmentation techniques, image representation and description, stereo vision and depth measurements, texture analysis, dynamic vision and motion analysis, matching and recognition.

Prerequisites: EECS 3300 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4360 Communication Systems

[3 credit hours]

Fourier transform applications in signal analysis and communication. Signals spectra, filtering, AM and FM modulation, noise and optimum receiver, sampling theorem, multiplexing, PCM, introduction to digital modulators and demodulators.

Prerequisites: EECS 3300 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4370 Information Theory And Coding

[3 credit hours]

Coding concepts, Huffman code, entropy analysis, channel and mutual information, channel capacity and Shannon's theorem, algebraic coding theory and application to blockcode and cyclic code, introduction to convolutional code.

Prerequisites: EECS 3300 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4380 Digital Signal Processing

[3 credit hours]

Discrete Fourier Transform (DFT), discrete convolution and correlation, Fast Fourier Transform (FFT) and its applications, design of IIR and FIR digital filters, multirate/channel digital systems, decimation and interpolation.

Prerequisites: EECS 3210 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4390 Wireless And Mobile Networks

[3 credit hours]

Mobile radio propagation; the cellular concept; multiple radio access; multiple division techniques; channel allocation; mobile communication systems; existing wireless systems; network protocols; AD HOC and sensor networks; wireless LANS and PANS; recent advances.

Prerequisites: (EECS 3210 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 3300 FOR LEVEL UG WITH MIN. GRADE OF D-) OR (EECS 3210 FOR LEVEL UG WITH MIN. GRADE OF D- AND MIME 4000 FOR LEVEL UG WITH MIN. GRADE OF D-)

EECS4400 Solid State Electronics

[3 credit hours]

A comprehensive treatment of the theory and operation of physical electronic devices emphasizing electrical transport in metals and semiconductors and various models of BJT's and FET's.

Prerequisites: (EECS 3400 FOR LEVEL UG WITH MIN. GRADE OF D- AND PHYS 3070 FOR LEVEL UG WITH MIN. GRADE OF D-)

EECS4410 Electro-Optics

[3 credit hours]

Introduction to laser physics, optics, optical waveguides, optical communication systems and electro-optics. Design of light processing and communication systems will be considered with emphasis on optics and optical communication.

Prerequisites: EECS 3710 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4460 Power System Analysis

[3 credit hours]

Power system symmetrical components, fault analysis, transient stability analysis, transmission system modeling, distribution networks.

Prerequisites: EECS 3460 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4470 Electronic Design

[3 credit hours]

Principles and techniques of analog active circuit design. Selected design problems are given and circuits using standard parts are designed and laboratory tested. A design notebook is kept.

Prerequisites: EECS 3210 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 3420 FOR LEVEL UG WITH MIN. GRADE OF D-

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EECS4480 Electronic Energy Processing I

[3 credit hours]

Electronic power switching circuits. Half-wave and full-wave rectification. Characteristics of power semiconductors. Phase-controlled rectifiers and inverters. Isolated and non-isolated dc-dc converters.

Prerequisites: (EECS 3400 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 3460 FOR LEVEL UG WITH MIN. GRADE OF D-)

EECS4490 Electronic Energy Processing II

[3 credit hours]

Resonant dc-dc converters. DC-AC inverters and harmonic analysis. Variable-speed motor drives. Laboratory design and analysis of various electronic energy processing circuits.

Prerequisites: EECS 4480 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4500 Programming Language Paradigms

[3 credit hours]

Fundamental concepts of modern programming languages. Differences and similarities between procedural, functional, object-oriented and rule-based languages are examined as well as their impact on the programming process.

Prerequisites: (EECS 1550 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 3500 FOR LEVEL UG WITH MIN. GRADE OF D-) OR (EECS 1580 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 3500 FOR LEVEL UG WITH MIN. GRADE OF D-)

EECS4520 Advanced Systems Programming

[4 credit hours]

Pertinent concepts of systems programming. Topics covered include: synchronization, distributed programming models, kernel design, peripheral handling, file systems and security history and methods.

Prerequisites: EECS 3540 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4530 Computer Graphics I

[4 credit hours]

An introduction to typical computer graphics systems and their operation. Interactive techniques will be introduced as well as representations and projections of three-dimensional images. Exercises using graphics equipment are assigned.

Prerequisites: EECS 1500 FOR LEVEL UG WITH MIN. GRADE OF D- OR EECS 1510 FOR LEVEL UG WITH MIN. GRADE OF D-

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EECS4540 Computer Graphics II

[4 credit hours]

Examines current topics related to realistic and representative 3D computer graphics. Topics include curve and surface geometry, solid modeling, ray tracing, radiosity and real-time computer graphics.

Prerequisites: EECS 2510 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 4530 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4560 Database Systems I

[3 credit hours]

The following topics are covered: relational database modeling, query languages, design issues and implementation issues of databases. An appropriate database language is introduced and used to demonstrate principles.

Prerequisites: EECS 2510 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4580 Human Computer Interface Design

[3 credit hours]

[3 hours] The design of human-computer interfaces and their importance to human-computer interaction. Human engineering, implementation techniques, prototyping, and current and future research areas. Prerequisite: EECS 3550

Prerequisites: EECS 3350 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4590 Algorithms

[3 credit hours]

Techniques for devising efficient computer algorithms. Topics include: divide-and-conquer techniques, dynamic programming, linear programming, graph algorithms, greedy algorithms, NP and P complexity classes, and approximation algorithms for NP complete problems.

Prerequisites: EECS 2510 FOR LEVEL UG WITH MIN. GRADE OF D AND EECS 4100 FOR LEVEL UG WITH MIN. GRADE OF D-

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EECS4600 Solid State Devices

[0-4 credit hours]

Theory and operation of physical electronic devices. Electrical transport in metals, semiconductors and models of BJT's and FET's. Optoelectronic devices and integrated circuits. Laboratory includes hands-on experimentation with basic semiconductor fabrication processes.

Prerequisites: EECS 3400 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4730 Open Source Software

[3 credit hours]

History and description of the open source movement, who participates, how it works, and why it works. Evolution patterns of open source development, the code itself, and the open source community as a whole. Open source licenses, legal issues, and commercial markets. Survey of real-world implementations.

Prerequisites: EECS 3550 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4740 Artificial Intelligence

[3 credit hours]

This course explores the topic of intelligent software agents with a emphasis on hands-on design of adaptive problem-solving agents for environments of increasing complexity ranging from single-agent computer games to complex real-world mult-agent environments.

Prerequisites: EECS 2510 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4750 Machine Learning

[3 credit hours]

This course emphasizes learning algorithms and theory including concept, decision tree, neural network, comprtational, Bayesian, evolutionary, and reinforcement learning.

Prerequisites: (MIME 4000 FOR LEVEL UG WITH MIN. GRADE OF D- AND MATH 2890 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 2100 FOR LEVEL UG WITH MIN. GRADE OF D-)

EECS4760 Computer Security

[3 credit hours]

Survey of computer security concepts: ethics and responsibility, OS, vulnerabilities and intrusion detection, viruses and worms, defensive strategies including secret/public key cryptosystems, firewalls and decoys.

Prerequisites: EECS 2110 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 3450 FOR LEVEL UG WITH MIN. GRADE OF D-

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EECS4770 Computer Hacking and forensic Analysis

[3 credit hours]

Hacking ethics, beneficial vs. malicious hacking, unconventional (extreme) programming techniques, casing networks and operating systems, exposing system vulnerabilities through penetration, collecting and analyzing digital evidence, forensic tools, case studies.

Prerequisites: EECS 2110 FOR LEVEL UG WITH MIN. GRADE OF D-

EECS4980 Special Topics In EECS

[1-4 credit hours]

Emerging topics of interest are introduced. One credit per lecture/recitation hour and/or 2.5 lab hours per week.

EECS4990 Independent Study In Eecs

[1-4 credit hours]

Selected topics in electrical engineering or computer science and engineering. The instructor will specify the scope of the investigation and will meet regularly with the student(s). The study is expected to require an average of 3 hours student effort per week per credit.

EECS5130 Digital Design

[4 credit hours]

The design of digital systems, design methodologies, hardware description language such as VHDL, behavioral-, dataflow- and structural-level description of digital systems. Implementation technologies including PLDs and FPGAs.

EECS5170 Real-Time Embedded Systems Design

[3 credit hours]

Programming applications in a real-time environment. Applications programs in a multitasking environment. Examples from process control, robotics, signal analysis and multiwindow software.

EECS5220 Programmable Logic Controllers

[3 credit hours]

Programmable Logic Controllers (PLCs), programming, sensors, process control algorithms, interfacing of sensors and other I/O devices, simulation and networking.

EECS5240 Power Systems Operation

[3 credit hours]

Single Line Diagrams & Per Unit calculations, Network Matrices & Ybus for systems with uncoupled lines, Load Flow Techniques, Large system Loss Formula using Zbus, Real and Reactive Power Dispatch programming, Power systems relays & protection schemes.

EECS5260 Control Systems Design

[3 credit hours]

A general study of computer-aided design of control systems. Topics include: stability, compensation, pole placement, nonlinear systems and digital systems.

EECS5330 Image Analysis And Computer Vision

[3 credit hours]

Imaging geometry, image filtering, segmentation techniques, image representation and description, stereovision and depth measurements, texture analysis, dynamic vision and motion analysis, matching and recognition.

EECS5360 Communication Systems

[3 credit hours]

Fourier transform applications in signal analysis and communication. Signals spectra, Filtering, AM and FM modulations, Noise and optimum receiver, Sampling theorem, Multiplexing, PCM Introduction to digital modulators and demodulators.

EECS5370 Information Theory And Coding

[3 credit hours]

Coding concepts, Huffman code, Entropy analysis, Channel and mutual information, Channel capacity and Shannon's theorems, Algebraic coding theory and application to block code and cyclic code, Introduction to convolutional code.

EECS5380 Digital Signal Processing

[3 credit hours]

Discrete Fourier Transform (DFT), Discrete convolution and correlation, Fast Fourier Transform (FFT) and its applications. Design of IIR and FIR digital filters, Multi-rate/channel digital systems, Decimation and Interpolation.

EECS5390 Wireless And Mobile Networks

[3 credit hours]

Mobile radio propagation; traffic engineering; cellular concept; multiple radio access; multiple division techniques; channel allocation; mobile communication systems; existing wireless systems; network protocols; Ad Hoc and sensor networks; wireless LANS and PANS; recent advances.

EECS5400 Solid State Electronics

[3 credit hours]

A comprehensive treatment of the theory and operation of physical electronic devices emphasizing electrical transport in metals and semiconductors and various models of BJT's and FET's.

EECS5410 Electro-Optics

[3 credit hours]

Laser physics, optics, optical waveguides, optical communication systems and electro-optics. Design of light processing and communication systems will be considered with emphasis on optics and optical communication.

EECS5460 Power Systems Analysis

[3 credit hours]

Fault analysis, Transient Stability Analysis, Transmission System modeling, Distribution Networks.

EECS5470 Electronic Design

[3 credit hours]

Principles and techniques of analog active circuit design. Selected design problems are given; working circuits using standard parts are designed and laboratory tested. A design notebook is kept.

EECS5480 Electronic Energy Processing I

[3 credit hours]

Basic electronic power switching circuits. Half-wave and full-wave rectification. Characteristics of power semiconductors. Phase-controlled rectifiers and inverters. Isolated and non-isolated dc-dc converters.

EECS5490 Electronic Energy Processing II

[3 credit hours]

Resonant dc-dc converters. DC-AC inverters and harmonic analysis. Variable-speed motor drives. Laboratory design and analysis of various electronic energy processing circuits.

Prerequisites: EECS 5480 FOR LEVEL GR WITH MIN. GRADE OF C

EECS5500 Programming Language Paradigms

[3 credit hours]

The course investigates the fundamentals of modern programming languages. Differences and similarities between procedural, functional, object-oriented and rule-based languages are examined along with their impact on the programming process.

EECS5520 Advanced Systems Programming

[4 credit hours]

This course examines pertinent concepts of systems programming. Topics covered include: synchronization, distributed programming models, kernel design, peripheral handling, file systems and security history and methods.

EECS5530 Computer Graphics I

[4 credit hours]

An introduction to typical computer graphics systems and their operation. Interactive techniques will be introduced as well as representations and projections of three-dimensional images. Exercises using graphics equipment are assigned.

EECS5540 Computer Graphics II

[4 credit hours]

Examines current topics related to realistic and representative 3D computer graphics. Topics include curve and surface geometry, solid modeling, raytracing, radiosity and real-time computer graphics.

EECS5560 Database Systems I

[3 credit hours]

The following topics are covered: relational database modeling, query languages, design issues and implementation issued of databases. An appropriate database language is introduced and used to demonstrate principles.

EECS5740 Artificial Intelligence

[3 credit hours]

This course explores the topic of intelligent software agents with a emphasis on hands-on design of adaptive problem-solving agents for environments of increasing complexity ranging from single-agent computer games to complex real-world mult-agent environments.

EECS5750 Machine Learning

[3 credit hours]

This course emphasizes learning algorithms and theory including concept, decision tree, neural network, comprtational, Bayesian, evolutionary, and reinforcement learning.

Prerequisites: (MIME 4000 FOR LEVEL UG WITH MIN. GRADE OF D- AND MATH 2890 FOR LEVEL UG WITH MIN. GRADE OF D- AND EECS 2100 FOR LEVEL UG WITH MIN. GRADE OF D-)

EECS5760 Computer Security

[3 credit hours]

Survey of computer security concepts: ethics and responsibility, OS vulnerabilities and intrusion detection, viruses and worms, defensive strategies including secret/public key cryptosystems, firewalls and decoys.

EECS5920 Projects

[1-6 credit hours]

Independent research project with intensive investigation into an area of practical interest to the student and the instructor.

EECS5930 Electrical Engineering & Computer Science Seminar

[1 credit hour]

All graduate students are expected to attend the seminars and to prepare a report summarizing their experiences, questions and the impact of the seminar series. Students will also present their thesis and dissertation results.

EECS5980 Special Topics in EECS

[1-4 credit hours]

Pilot offerings of new courses involving emerging topics of interest are introduced using this number. One credit per lecture hour or 2.5 lab hours per week.

EECS6110 Advanced Computer Architecture

[3 credit hours]

Architectural development in computer systems and scability. Processors and arithmetic algorithms. Memory hierarchy, shared memory and cache architecture. Pipeline, superscaler and vector organization.

EECS6300 Random Signals And Optimal Filters

[3 credit hours]

Description and properties of random signals and their processing by optimal filters. Correlation and power spectra. GRP. Narrowband noise. Signal detection (matched filter) and estimation (Wiener and Kalman filters).

EECS6320 Data Compression For Multimedia Communication

[3 credit hours]

Multimedia information representation, Huffman, run length and arithmetic coding, predictive, transform, pyramid coding; vector quantization and subband coding; wavelet-based coding, data packetization, error resilience coding, mutimedia compression standards, JPEG, MPEG coding.

EECS6340 Modern Communications Engineering I

[3 credit hours]

Introduction to detection and estimation and applications to the bandpass signals, Bibary and M-ary digital modulation techniques, Error-control convolutional coding, Trellis Coded Modulation (TCM), Spread Spectrum (SS) communication techniques.

EECS6350 Modern Communications Engineering II

[3 credit hours]

Digital transmission over Gaussian/non-Faussian channels, Satellite systems (GEO and LEO) and multiple accesses, Cellular and satellite communication network, Mobile/wireless Personal communication services (PCS) and its networking.

Prerequisites: EECS 6340 FOR LEVEL GR WITH MIN. GRADE OF C

EECS6390 Modeling And Performance Evaluation Of Communication Networks

[3 credit hours]

Communication network model-based performance evaluation methodology. Principles of stochastic processes in communication networks. Modeling and analysis of LANs, MANs, and WANs. Single class networks and Jackson networks. Multimedia network analysis.

EECS6550 Software Specification And Design

[3 credit hours]

This course covers the software development steps of specification, requirements analysis and design in depth. Computer-human interfaces are also discussed.

EECS6660 Field Programmable Gate Arrays

[3 credit hours]

Introduction to FPGA's. Programming technology. Logic block architectures. Routing architectures. FPGA based VLSI design. Design tools.

EECS6900 Independent Research

[1-6 credit hours]

Selected topics from current EE and CSE research with intensive investigation into recent literature in an area of mutual interest to the student and the instructor.

EECS6960 Master's Graduate Research And Thesis

[1-9 credit hours]

Graduate research towards the completion of a Master's degree.

EECS6980 Special Topics In Electrical Engineering & Computer Science

[1-5 credit hours]

Selected topics in the field of Electrical Engineering and Computer Science in areas of special interest to the class and the professor.

EECS6990 Independent Study

[1-3 credit hours]

In depth study of a selected topic of mutual interest to the student and the instructor.

EECS8110 Advanced Computer Architecture

[3 credit hours]

Architectural development in computer systems and scability. Processors and arithmetic algorithms. Memory hierarchy, shared memory and cache architecture. Pipeline, superscaler and vector organization.

EECS8220 Nonlinear Control Systems

[3 credit hours]

The multiple input describing function. Random signals in nonlinear systems. The phase plane, equilibrium points, limit cycles and linearization methods. Lyapunov stability theorems. Optimum switching systems. Selected applications.

EECS8300 Random Signals And Optimal Filters

[3 credit hours]

Description and properties of random signals and their processing by optimal filters. Correlation and power spectra. GRP. Narrowband noise. Signal detection (matched filter) and estimation (Wiener and Kalman filters).

EECS8320 Data Compression For Multimedia Communication

[3 credit hours]

Multimedia information representation, Huffman, run length and arithmetic coding, predictive, transform, pyramid coding; vector quantization and subband coding; wavelet-based coding, data packetization, error resilience coding, mutimedia compression standards, JPEG, MPEG coding.

EECS8340 Modern Communications Engineering I

[3 credit hours]

Introduction to detection and estimation and applications to the bandpass signals, Binary and M-ary digital modulation techniques, Error-control convolutional coding, Trellis Coded Modulation (TCM), Spread Spectrum (SS) communication techniques.

EECS8350 Modern Communications Engineering II

[3 credit hours]

Digital transmission over Gaussian/non-Gaussian channels, Satellite systems (GEO and LEO) and multiple accesses, Cellular and satellite communication network, Mobile/wireless Personal communication services (PCS) and its networking.

Prerequisites: EECS 6340 FOR LEVEL GR WITH MIN. GRADE OF C

EECS8390 Modeling And Performance Evaluation Of Communication Networks

[3 credit hours]

Communication network model-based performance evaluation methodology. Principles of stochastic processes in communication networks. Modeling and analysis of LANs, MANs, and WANs. Single class networks and Jackson networks. Multimedia network analysis.

EECS8550 Software Specification And Design

[3 credit hours]

This course covers the software development steps of specification, requirements analysis and design in depth. Computer-human interfaces are also discussed.

EECS8660 Field Programmable Gate Arrays

[3 credit hours]

Introduction to FPGA's. Programming technology. Logic block architectures. Routing architectures. FPGA based VLSI design. Design tools.

EECS8900 Independent Research

[1-6 credit hours]

Selected topics from current EE and CSE research with intensive investigation into recent literature in an area of mutual interest to the student and the instructor.

EECS8960 Dissertation

[1-15 credit hours]

Graduate research towards completion of a doctoral degree.

EECS8980 Current Topics In Electrical Engineering & Computer Science

[1-5 credit hours]

Current topics in the field of Electrical Engineering and Computer Science in areas of special interest to the class and the professor. Students will be expected to complete a written project based on a review of the research literature of the area covered in this course.

EECS8990 Independent Study

[1-3 credit hours]

In depth study of a selected topic of mutual interest to the student and the instructor.

EEES1010 Physical Geology

[3 credit hours]

Introduction to classification and origins of rocks and minerals, surficial processes and landscape development, groundwater and other natural resources, geologic structures, earthquakes and the earth's interior, plate tectonics and geologic time. No credit if EEES2100 is taken. Natural sciences core course.

EEES1020 Introductory Geology Laboratory

[1 credit hour]

Identification of rocks and minerals. Study of the Earth's surface features and geologic structures through the use of topographic maps and aerial photographs.

EEES1050 Geological Hazards And The Environment

[3 credit hours]

Introduction to risk mitigation involving hazardous geological processes and materials: volcanic eruptions, earthquakes, floods, ground subsidence and collapse, radon, asbestos and others.

EEES1130 Down To Earth: Environmental Science

[3 credit hours]

Evaluation of environmental controversies using ecology, economics and human values. Issues range from global change, overpopulation, food production, pollution, disease, endangered species, to unique habitats including rainforests and coral reefs. (not for credit in the major)[Fall, Spring]. Natural Sciences core course.
