NORTH CAROLINA STATE UNIVERSITY
Department of Electrical and Computer Engineering
Courses for Summer and Fall 2011

Summer 2012

ECE 402-051
Title – Communications Engineering Instructor – K. Townsend
Prerequisites - ECE 301 and ST 371
Fundamentals of communications engineering. PCM, digital transmission, PSK, QAM, baseband, FSK, ASK; link budgets for satellite, cellular, and cable systems. Brief coverage of AM, FM, SSB, error correction/detection, modulation, the effects of noise and bandwidth.

ECE 421-051
Title - Introduction to Signal Processing Instructor – S.T. Alexander
Preq: ECE 301, ST 371
Concepts of electrical signal processing. Fourier series, Fourier transform, Z-transform, advanced linear systems and stochastic processes. Analog/digital and digital/analog conversion, digital filters and modulation. Major design project.

ECE 456-051
Title – Mechatronics Instructor – M.Y. Chow
Prerequisites – ECE 435
The study of electro-mechanical systems controlled by microcomputer technology. The theory, design and construction of smart systems; closely coupled and fully integrated products and systems. The synergistic integration of mechanisms, materials, sensors, interfaces, actuators, microcomputers, controllers, and information technology.

Fall 2012

ECE 402-001
Title – Communications Engineering Instructor – K. Townsend
Prerequisites - ECE 301 and ST 371
Fundamentals of communications engineering. PCM, digital transmission, PSK, QAM, baseband, FSK, ASK; link budgets for satellite, cellular, and cable systems. Brief coverage of AM, FM, SSB, error correction/detection, modulation, the effects of noise and bandwidth.

ECE 404-001
Title – Introduction to Solid-State Devices Instructor – S. Bedair
Prerequisites – ECE302
Basic principles required to understand the operation of modern solid-state devices. Derivation of electrical characteristics of devices such as diodes, bipolar transistors, MOS transistors and LEDs. Applications to design of electronic circuits.

ECE 406-001
Title - Design of Complex Digital Systems Instructors – D. Baron
Prerequisites - A grade of C- or better in ECE 212
Design principles for complex digital systems: Iteration, top-down/bottom-up, divide and conquer, and decomposition. Descriptive techniques, including block diagrams, timing diagrams, register transfer, and hardware-description languages. Consideration of transmission-line effects on digital systems. **(ECE 406L required)**

ECE 407-001
Title – Introduction to Computer Communications Instructor – M. Sichitiu
Corequisites - ECE 301
Engineering principles of computer communications: summary of digital transmission, media and switching; error control, layering concept, overview of protocols; architectures for local, metropolitan, and wide-area networks; emerging issues in digital communications systems.

ECE 420-001
Title – Wireless Communication Systems Instructor – S.T. Alexander
Prerequisites – ECE 402
System level understanding of wireless mobile communications systems. Mobile radio propagation, system definitions, applicable traffic models, coding, modulation, frequency reuse, cellular concept, equalization; standards such as AMPS, USDS, CDMA(IS-95), GSM.

ECE 421-001
Title - Introduction to Signal Processing Instructor – A. Duel-Hallen
Preq: ECE 301, ST 371
Concepts of electrical signal processing. Fourier series, Fourier transform, Z-transform, advanced linear systems and stochastic processes. Analog/digital and digital/analog conversion, digital filters and modulation. Major design project.

ECE 422-001
Title – Transmission Lines and Antennas for Wireless Instructor – G. Bilbro
Preq: ECE 303
Review of time-varying electromagnetic theory. A study of the analytical techniques and the characteristics of several useful transmission lines and antennas. Examples are coaxial lines, waveguides, microstrip, optical fibers and dipole, monopole and array antennas.

ECE 435-001
Title – Elements of Control Instructor – E. Lobaton
Prerequisites - ECE 301
Introductory theory of open- and closed-loop control. Dynamic analysis of error detectors, amplifiers, and motors. Component transfer characteristics and block diagram representations.

ECE 442-001
Title – Integrated Circuit Technology and Fabrication Instructor – D.G. Yu
Prerequisites – ECE 404
Semiconductor device and integrated-circuit processing and technology. Wafer specification and preparation, oxidation, diffusion, ion implantation, photolithography, design rules and measurement techniques.

ECE 445-001
Title – Frontiers of Nanoelectronics Instructor – V. Misra
Prerequisites – ECE 302
This course will discuss frontiers of nanoelectronics including fundamentals of silicon based devices and their impact on scaled logic and memory devices as well as organic based devices such as carbon nanotubes and molecular electronics. Additional topics include recent uses of polymer films for memory and photovoltaic applications, quantum confinements in 1D, 2D, and 3D, quantum dots, nanowires and resonant tunneling devices. Included are methods to create and measure nanostructures.

ECE 451 001
Title – Power System Analysis Instructor – A. Chakrabortty
Prerequisites – ECE 305
Long-distance transmission of electric power with emphasis on load flow, economic dispatch, fault calculations and system stability. Applications of digital computers to power-system problems. Major design project.

ECE 456-001
Title – Mechatronics Instructor – M. Chow
Prerequisites – ECE 435
The study of electro-mechanical systems controlled by microcomputer technology. The theory, design and construction of smart systems; closely coupled and fully integrated products and systems. The synergistic integration of mechanisms, materials, sensors, interfaces, actuators, microcomputers, controllers, and information technology.

ECE 460-001
Title – Digital Systems Interfacing Instructor – M. Chow
Prerequisites – ECE 406
Concepts of microcomputer system architecture and applications to fundamental computer hardware. Theoretical and practical aspects of interfacing and a variety of microprocessor peripheral chips with specific microprocessor/microcomputer systems from both hardware and software points of view.

ECE 463-001
Title - Advanced Microprocessor Systems Design Instructor – H. Zhou
Prerequisites - ECE 406
Advanced topics in microprocessor systems design, including processor architectures, virtual-memory systems, multiprocessor systems and single-chip microprocessors. Architectural examples include a variety of processors of current interest, both commercial and experimental. Major design project.

ECE 466-001
Title – Compiler Optimization and Scheduling Instructor – J. Tuck
Prerequisites - ECE 306 and either ECE 309 or CSC 316
Provide insight into current compiler designs dealing with present and future generations of high performance processors and embedded systems. Investigate dataflow analysis and memory disambiguation, classical and parallelism enhancing optimizations, scheduling and speculative execution, and register allocation. Review of techniques used in current research compilers.

ECE 480-001
Title - Senior Design Project in Electrical Engineering Instructor – B. Greene
Prerequisites - ECE 212, 301, 302, 303, COM 110, and any 2 ECE 400 level electives, EE Major
Applications of engineering and basic sciences to the total design of electrical engineering circuits and systems. Consideration of the design process including feasibility study, preliminary design detail, cost effectiveness, along with development and evaluation of a prototype accomplished through design team project activity. Complete written and oral engineering report required.

ECE 481-001
Title - Senior Design Project in Computer Engineering Instructor – B. Greene
Prerequisites - ECE 212, 301, 302, 303, 406, COM 110, and any 1 ECE 400 level electives, CPE Major
Application of engineering and basic sciences to the total design of hardware and software systems. Consideration of the design process including feasibility study, preliminary design detail, cost effectiveness, along with development and evaluation of a prototype accomplished through design team activity. Complete written and oral engineering report required.

ECE 482-001
Title - Senior Design Project in EE and CPE I Instructor – S. Walsh
Prerequisites – ECE 383
Applications of engineering, mathematics, basic sciences, finance, and business to the design and development of prototype engineering products. This course requires a complete written report and an end-of-course presentation. This is the first course in a two semester sequence. Students taking this course will implement their designed prototype in ECE 483: Senior Design project in Electrical Engineering and Computer Engineering II – Engineering Entrepreneurs. Departmental approval required.

ECE 492 004
Title – Special Topics – Fundamentals of Power Electric Instructor – A. Huang
Prerequisites – None
This course introduces the basic concept of power conversion, which converts electric energy from one form to the other. Specifically, the student will develop a basic understanding of high frequency switching mode power converters. Develop skills for designing dc/dc power converters used in cell phones and laptop computers. Develop skills for a complete design of dc/dc converter controller system.

ECE 492 006
Title – Special Topics – Optical Communications Instructor – J. Muth
Prerequisites –
Fundamentals of optoelectronic devices and photonic systems. Lasers, fiber optics, photodetectors and their use in optical communication systems and the industrial environment. Labs include: fiber splicing, building an optical communications link, fiber optic sensors and gyroscope, charge coupled devices (CCD arrays and cameras) and characterization of laser diodes and photodetectors. Emphasis placed on practical uses of optical systems and optoelectronic devices in telecommunications systems, consumer goods, and industry. *Optical Communications Lab (ECE 492 201, 202, 203) is required*.

ECE 492 018
Title – Special Topics – Architecture of Parallel Computers Instructor – Y. Solihin
Prerequisites –
Information is forthcoming…