### Course Descriptions

**ECE 524** three credits  
**Solid State Electronics**  
3 hours lecture  
Prerequisite: Permission of instructor  
Solid state device behavior. Among the topics covered are semiconductor fundamentals, p-n junction theory, and both the bipolar and the field effect transistor. Emphasis is placed on those transistor parameters that need to be considered in VLSI and microwave applications.

**ECE 535** three credits  
**Analog Integrated Circuit Design**  
3 hours lecture  
Prerequisite: ECE 413 or ECE 533 or permission of instructor  
Introduction to the design of CMOS analog integrated circuits (IC’s), with the occasional references to bipolar IC’s to make comparisons. Required readings from the current literature lead to a formal written report on recent developments in analog IC’s. Students are required to complete the design of a complex IC and make a class presentation of its design methodology and simulation results.

**ECE 560** three credits  
**Computer Systems Performance Evaluation**  
3 hours lecture  
Prerequisites: ECE 460 and graduate standing  
Development of a broad working knowledge of probability, queuing theory, petri-nets, simulation and empirical modeling as applied to computer systems hardware and software performance modeling and assessment. The course is oriented toward a practical application of theory and concepts with an emphasis placed on the use of computer tools to model performance and to perform tradeoff analysis.

**ECE 562** three credits  
**Advanced Computer Architecture**  
3 hours lecture  
Prerequisite: ECE 561 or permission of instructor  
Quantitative computer analysis, design and implementation of single-instruction single-data computer systems. Students develop an understanding of cost/performance tradeoffs associated with instruction set design, memory-hierarchy design including cache (TLB, instruction and data), and input/output including storage systems and interconnection networks. Performance enhancements such as RISC, pipelining, memory prefetching and multi-threading are studied.
ECE 567 three credits  
**Microprocessors II**  
3 hours lecture  
Prerequisite: ECE 566  
Continuation of ECE 566. Emphasis is on interfacing various processors to real world external devices. Students develop both hardware and software for this purpose. Typical projects include A/D and D/A conversion, and DMA operations on an 80x86 platform.

ECE 569 three credits  
**Advanced Computer Networks**  
3 hours lecture  
Prerequisite: ECE 469 or permission of instructor  
Advanced topics on the protocols, algorithms and tools supporting the development and delivery of quality assured services over networks. The course covers capabilities provided by emerging ultra-fast network technologies, routers and routing functions. Emphasis in on today’s de-facto Internet standards of TCP/IP protocol suite, recent developments and research issues for next generation internetworking driven by multimedia real-time distributed applications requiring quality of service guarantees.

ECE 575 three credits  
**Sonar Signal Processing**  
3 hours lecture  
Prerequisites: ECE 521 and ECE 597; or permission of instructor  
Classical theories in detecting and processing both active and passive signals in noise with special emphasis on the underwater environment and associated techniques in sound navigation ranging (SONAR). Both spatial and temporal processing methods are studied including beamforming, matched filtering, effects of noise and interference, application and utility of frequency agile signals, narrowband and broadband passive techniques, and adaptive algorithms to address the time/space varying interference sources. Applications in underwater detection, classification, localization and communication are also discussed.

ECE 581 three credits  
**Mathematics of Systems Analysis**  
3 hours lecture  
Prerequisite: Graduate standing  
Elementary exposition of linear algebra and time domain methods and their utility in the analysis and design of linear systems. Linear space, state variables, controllability, observability, assignability, linear state variable feedback design, time variant systems and adjoint model are included.

ECE 591 three credits  
**Topics in ECE: Wireless Communications**  
3 hours lecture  
Prerequisite: Permission of instructor  
Introduction to the principles and practice of wireless communications. The course presents the concepts of frequency reuse and cellular structure and covers propagation effects, multipath fading, digital and analog modulation, diversity and equalization, multiple access and wireless networks. The course also presents modern wireless systems and standards. The focus of the course is to understand wireless communications at a systems level and is designed as a senior elective for ELE and CPE majors. Basic understanding of electromagnetic wave propagation and communication theory is expected. The course includes a project related to new technological advances in wireless systems.

ECE 597 three credits  
**Underwater Acoustics I**  
3 hours lecture  
Prerequisite: ECE 557 or permission of instructor  
Underwater aspects of sound including a review of the wave equation and its solutions. Topics include: production, propagation and reception of sound underwater, radiation impedance, and the Eikonal equation; normal modes in rectangular and cylindrical cavities, acoustic waveguides, group speed and phase speed; introduction to continuous and discrete arrays and beam steering; introduction to transducer properties, sensitivities, and calibration. The wave equation and its application to boundary value problems are reviewed. Velocity profiles in the ocean, ray tracing techniques and propagation of sound in the sea, including transmission loss and the sonar equations are also developed.

ECE 632 three credits  
**Advances in Database Systems**  
3 hours lecture  
Prerequisite: ECE 541  
An in depth exploration of the theory, architecture, implementation and design of state-of-the-art specialized data base systems. Students will develop an understanding of the requirements and design issues associated with emerging technologies applied to specialized database systems. Database systems to be studied will be selected based on present research interest of course faculty and students.

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