Electrical Engineering: Digital Systems

EEDG 5325 (CE 5325) Hardware Modeling Using HDL (3 semester hours) This course introduces students to hardware description languages (HDL) beginning with simple examples and describing tools and methodologies. It covers the language, dwelling on fundamental simulation concepts. Students are also exposed to the subset of HDL that may be used for synthesis of custom logic. HDL simulation and synthesis labs and projects are performed using commercial and/or academic VLSI CAD tools. Prerequisite: EE 3320 or equivalent. (3-0) T

EEDG 6301 (CE 6301) Advanced Digital Logic (3 semester hours) Modern design techniques for digital logic. Logic synthesis and design methodology. Link between front-end and back-end design flows. Field programmable gate arrays and reconfigurable digital systems. Introduction to testing, simulation, fault diagnosis and design for testability. Prerequisites: EE 3320 or equivalent and background in VHDL/Verilog. (3-0) T

EEDG 6302 (CE 6302) Microprocessor Systems (3 semester hours) Design of microprocessor based systems including I/O and interface devices. Microprocessor architectures. Use of emulators and other sophisticated test equipment. Extensive laboratory work. Prerequisite: EE 4304 or equivalent and background in VHDL/Verilog. (2-3) Y

EEDG 6303 (CE 6303) Testing and Testable Design (3 semester hours) Techniques for detection of failures in digital circuits and systems. Fault modeling and detection. Functional testing and algorithms for automatic test pattern generation (ATPG). Design of easily testable digital systems. Techniques for introducing built-in self test (BIST) capability. Test of various digital modules, such as PLA's, memory circuits, datapath, etc. Prerequisite: EE 3320 or equivalent and background in VHDL/Verilog. (3-0) Y

EEDG 6304 (CE 6304, CS 6304) Computer Architecture (3 semester hours) Trends in processor, memory, I/O and system design. Techniques for quantitative analysis and evaluation of computer systems to understand and compare alternative design choices in system design. Components in high performance processors and computers: pipelining, instruction level parallelism, memory hierarchies, and input/output. Students will undertake a major computing system analysis and design project. Prerequisite: EE 4304 or CS 3340 and C/C++. (3-0) Y

EEDG 6305 (CE 6305) Computer Arithmetic (3 semester hours) Carry look ahead systems and carry save adders. Multipliers, multi-bit recoding schemes, array multipliers, redundant binary schemes, residue numbers, slash numbers. High-speed division and square root circuits. Multi-precision algorithms. The IEEE floating point standard, rounding processes, guard bits, error accumulation in arithmetic processes. Cordic algorithms. Prerequisites: EE 3320 and C/C++. (3-0) Y

EEDG 6306 (CE 6306) Application Specific Integrated Circuit Design (3 semester hours) This course discusses the design of application specific integrated circuits (ASIC). Specific topics include: VLSI system design specification, ASIC circuit structures, synthesis, and implementation of an ASIC digital signal processing (DSP) chip. Prerequisite: EE 3320 (3-0) Y

EEDG 6307 (CE 6307) Fault-Tolerant Digital Systems (3 semester hours) Concepts in hardware and software fault tolerance. Topics include fault models, coding in computer systems, fault diagnosis and fault-tolerant routing, clock synchronization, system reconfiguration, etc. Survey of practical fault-tolerant systems. Prerequisite: EEDG 6301, ENGR 3341 or equivalent. (3-0) R

EEDG 6308 (CE 6308, CS 6396) Real-Time Systems (3 semester hours) Introduction to real-time applications and concepts. Real-time operating systems and resource management. Specification and design methods for real-time systems. System performance analysis and optimization techniques. Project to specify, analyze, design, implement and test small real-time system. Prerequisite: CS 5348. (3-0) R

EEDG 6345 (CE 6345) Engineering of Packet-Switched Networks (3 semester hours) Detailed coverage, from the point of view of engineering design, of the physical, data-link, network and transport layers of IP (Internet Protocol) networks. This course is a masters-level introduction to packet networks. Prior knowledge of digital communication systems is strongly recommended. Prerequisite: EE 3350 or equivalent. (3-0) Y

EEDG 6370 (CE 6370) Design and Analysis of Reconfigurable Systems (3 semester hours) Introduction to reconfigurable computing, programmable logic: FPGAS, CPLDs, CAD issues with FPGA based design, reconfigurable systems: emulation, custom computing, and embedded application based computing, static and dynamic hardware, evolutionary design, software environments for reconfigurable systems. Prerequisite: EE 3320 or equivalent. (3-0) R

EEDG 6375 (CE 6375) Design Automation of VLSI Systems (3 semester hours) This course deals with various topics related to the development of CAD tools for VLSI systems design. Algorithms, data structures, heuristics and design methodologies behind CAD tools. Design and analysis of algorithms for layout, circuit partitioning, placement, routing, chip floor planning, and design rule checking (DRC). Introduction to CAD algorithms for RTL and behavior level synthesis, module generators, and silicon compilation. Prerequisite: CS 5343. Co-requisite: EECT 6325. (3-0) Y

EEDG 6398 (CE 6398, CS 6398) DSP Architectures (3 semester hours) Typical DSP algorithms, representation of DSP algorithms, data-graph, FIR filters, convolutions, Fast Fourier Transform, Discrete Cosine Transform, low power design, VLSI implementation of DSP algorithms, implementation of DSP algorithms on DSP processors, DSP applications including wireless communication and multimedia. Prerequisite: CS 5343. (3-0) Y

EEDG 7304 (CE 7304) Advanced Computer Architecture (3 semester hours) Advanced research topics in multi-processor, network and reconfigurable architectures. Focuses on current research in the area of computer system architecture to prepare students for a career in computer architecture research. Course will use articles from current technical literature to discuss relevant topics, such as digital signal processors and VLIW processors. Prerequisites: EEDG 6304, CS 5348, ENGR 3341 and knowledge of C/C++. (3-0) R

EEDG 7328 (CE 7328) Physical Design of High-Speed VLSI Circuits (3 semester hours) Techniques for the physical design of high-speed VLSI circuits. Topics related to interconnection circuit modeling, performance-driven routing, buffer and wire sizing, placement and floor planning,

technology mapping and performance evaluation issues encountered in high-speed VLSI circuit designs. Discussion of state-of-the-art practical industrial design examples. A project related to the development of a prototype CAD tool. Prerequisites: CE/EECT 6325 and knowledge of programming in C. (3-0) T

EEDG 7v81 Special Topics in Digital Systems (1-6 semester hours) For letter grade credit only. (May be repeated to a maximum of 9 hours.) ([1-6]-0) R