

COMPUTER ENGINEERING (4450)

4450:101 Tools for Computer Engineering (3 Credits)

Corequisite: 3450:221 or 3450:149. Orientation to degree programs and design practice in electrical and computer engineering. Introduction to computer applications and resources for engineering studies.

4450:208 Programming for Engineers (3 Credits)

Prerequisite: 4400:101 or permission. Introduction to programming. Environment and tools. C programming language. Machine level data forms and organization.

4450:220 Digital Logic Design (4 Credits)

Corequisites: 4400:101 or 4450:101 or 4800:101. Boolean algebra and simplification of logic functions. Combinational and synchronous sequential circuits. Laboratory projects include design of digital systems with hardware description language and simulation.

4450:301 Undergraduate Research I: Computer Engineering (1 Credit)

Prerequisites: completion of [4400:101 or 4450:101], 4400:230, 4400:231, 4400:330, 4400:332 and 4450:220 with a combined average grade of 3.0 or higher, admission to an engineering major within the College of Engineering and Polymer Science, and permission. Research project, supervised by faculty member of the department; requires oral research presentation and written report.

4450:302 Undergraduate Research II: Computer Engineering (1 Credit)

Prerequisites: [4400:301 or 4450:301], admission to an engineering major within the College of Engineering and Polymer Science, and permission. Research project, supervised by faculty member of the department; requires oral research presentation and written report.

4450:303 Undergraduate Research III: Computer Engineering (1 Credit)

Prerequisites: [4400:302 or 4450:302], admission to an engineering major within the College of Engineering and Polymer Science, and permission. Research project, supervised by faculty member of the department; requires oral research presentation and written report to the department, and presentation of work in a research venue outside the department.

4450:304 Undergraduate Research IV: Computer Engineering (1 Credit)

(May be repeated. May not be applied to degree requirements.) Prerequisite: 4450:303 or 4400:303, and permission. Research project, supervised by faculty member of the department; requires oral research presentation and written report.

4450:309 Design Project Seminar - Computer Engineering (1 Credit)

Prerequisites: Junior or higher standing and admission to an engineering major within the College of Engineering and Polymer Science. Pre/ Corequisites: [3460:426 or 4450:325], 4450:367, [4450:420 or 4450:427], 4450:422, and 4450:440. Engineering capstone project selection and proposal, including preliminary technical specifications. Professional ethics. Intellectual property. Societal impact issues in engineering design.

4450:320 Computer Systems (3 Credits)

Prerequisite: 3460:209 or 4450:208, 4450:220 or 3450:208. Introduces the design and architecture of modern computer systems. Data and instruction representation. Conventional computer organization. Hardware and software design processes. The hardware/software interface.

4450:325 Operating Systems Concepts (3 Credits)

Prerequisites: 4450:320, 3460:210. Processes and threads. Process communication and resource sharing. Deadlock resolution. Memory management. File systems. Introduction to network operating systems.

4450:367 VLSI Design (3 Credits)

Prerequisites: 4400:360 and admission to an engineering major within the College of Engineering and Polymer Science. Digital logic circuits. Very large scale integration (VLSI) fabrication processes and layout design. Delay and power of digital circuits. Latches and flip-flops in VLSI. Memory design. System-level design issues. Design project.

4450:401 Senior Design Project I - Computer Engineering (3 Credits)

Prerequisites: 4450:309, senior standing, admission to an engineering major within the College of Engineering and Polymer Science, and completion of [3460:426 or 4450:325], 4450:367, [4450:420 or 4450:427], 4450:422, and 4450:440 with a combined average grade of 2.0 or higher. Design and preparation phase of an engineering team project. System specification, design, and simulations; ordering of components; subsystem implementations. Requires project presentations and report.

Gen Ed: - Capstone

4450:402 Senior Design Project II - Computer Engineering (3 Credits)

Prerequisites: 4450:401 and admission to an engineering major within the College of Engineering and Polymer Science. Implementation and evaluation phases of an engineering design project. Requires a project presentation and report.

Gen Ed: - Complex Issues Facing Society

4450:410 Embedded Scientific Computing (3 Credits)

Prerequisites: 4450:208 or 3460:209 and 4400:340. Fixed point, floating point representation and coding. Processor/DSP implementations. Assemblers, C language semantics. Adapting scientific library routines for embedded use. Minimizing complexity. Ill-conditioned problems.

4450:415 System Simulation (3 Credits)

Prerequisite: 4400:371 or 4450:440. Computer simulation of dynamic systems. Discrete system stability, linear multistep and Runge-Kutta methods, nonlinear systems, stiff systems, distributed systems and real-time computing.

4450:420 Computer Systems Design (3 Credits)

Prerequisite: 4450:320. Design of advanced processors at the microarchitecture level. Pipelining. Superscalar, vector and VLIW architectures. Instruction-level parallelism. Compiler support. Multiprocessor architectures.

4450:422 Embedded Systems Interfacing (3 Credits)

Prerequisites: [3460:209 or 4450:208] and admission to an engineering major within the College of Engineering and Polymer Science. Corequisite: 4400:360. Microcontroller structures and embedded peripherals. Interfaces to physical environments. Software access to peripherals including timers, ADCs and DACs. Synchronous and asynchronous communications. Interrupts. Real-time operating systems.

4450:427 Computer Networks (3 Credits)

Prerequisite: 4450:320; 4450:325 or 3460:426. Network architecture and protocol layering. Network design principles, communication protocols, and performance measures. Socket programming, routing, error detection and correction, access control, multimedia networking.

4450:440 Digital Signal Processing (3 Credits)

Prerequisites: 4400:340 and admission to an engineering major within the College of Engineering and Polymer Science. Signal sampling and reconstruction; data-converter models. Unilateral and bilateral z transforms. Discrete Fourier Transform (DFT); Fast Fourier Transform (FFT). Digital filter structures and design methods.

4450:462 Analog Integrated Circuit Design (3 Credits)

Prerequisite: 4400:360. CMOS processes and layout; amplifiers, current mirrors, and comparators; current, voltage, and bandgap references; switched capacitor circuits. Frequency and noise analysis techniques.

4450:465 Programmable Logic (3 Credits)

Prerequisite: 4450:220, 3460:209 or 4450:208. Digital design with programmable devices. PLD and FPGA architectures. Logic design and technology mapping tools.

4450:467 VLSI Circuits & Systems (3 Credits)

Prerequisite: 4450:367. High performance adders and multipliers for very large scale integration (VLSI) systems. Architectural synthesis. Design for high performance, low power, and testability.

4450:498 Special Topics: Computer Engineering (1-3 Credits)

(May be taken more than once) Prerequisite: Permission of department chair. Special topics in computer engineering.