

Computer Engineering (CPE)

CPE 211 - INTRO COMPUTER PROG FOR ENGR

Semester Hours: 3

Advanced programming in a high level language such as C++ with an emphasis on practice in solving engineering problems using top-down design and algorithms. Prerequisites: ENG 101 and MA 171 with concurrency.

CPE 211L - LABORATORY

Semester Hours: 0

This lab is the 0-credit lab component of the 3 credit course.

CPE 212 - FUNDAMENTALS SOFTWARE ENGRG

Semester Hours: 3

Introduction to structured programming using C++. Search and sort algorithms. Introduction to data structures. Applications to engineering related problems. Prerequisite: CPE 211.

CPE 221 - COMPUTER ORGANIZATION

Semester Hours: 3

Functional organization of stored-program digital computers including number representation, assembly language programming, computer hardware, micro-operations, and control logic; microprocessor architecture. Prerequisite: CPE 211 and EE 202 w/concurrency.

CPE 299 - CPE MENTORING I

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisite w/ concurrency: CPE 211.

CPE 322 - DIGITAL HDWR DESIGN FUNDMNTLS

Semester Hours: 3

Advanced concepts in Boolean algebra, use of hardware description languages as a practical means to implement hybrid sequential and combinational designs, digital logic simulation, rapid prototyping techniques, and design for testability concepts. Focuses on the actual design and implementation of sizeable digital design problems using representative Computer Aided Design (CAD) tools. Laboratory required. Prerequisite: CPE 221.

CPE 323 - INTRO TO EMBEDDED COMPUTER SYS

Semester Hours: 3

Hardware and software aspects in building embedded computer systems. Includes methods to evaluate design tradeoffs of different technology choices and technology capabilities and limitations of system components necessary to design and implement an embedded system and interface it to the outside world. Laboratory required. Prerequisite: CPE 221.

CPE 324 - ADV LOGIC DESIGN LABORATORY

Semester Hour: 1

Laboratory component of CPE 322 includes experimentation of fundamental concepts in digital logic design. Use of hardware description languages as a practical means to implement hybrid sequential and combinational digital designs, digital logic simulation, and rapid prototyping techniques. Prerequisite: CPE 322.

CPE 325 - EMBEDDED SYSTEMS LAB

Semester Hour: 1

Laboratory component of CPE 323 includes experience working with modern integrated software development environments and hardware platforms to solve practical problems.

CPE 348 - INTRO TO COMPUTER NETWORKS

Semester Hours: 3

Introduction to the concepts and architecture of computer networks. Review of communication protocols using the Internet and the TCP/IP model as major examples. High-speed networking, congestion control, data compression, security and distributed processing. Prerequisites: CPE 211 and CPE 221.

CPE 353 - SOFTWARE DESIGN & ENGINEERING

Semester Hours: 3

Hands-on experience developing a substantial software project using software design tools such as SQL database system and the Qt graphical interface development environment. Introduction to a software process including requirements elicitation and testing techniques. Prerequisites CPE 212 and CS 317 (with concurrency).

CPE 381 - FUND SIGNALS & SYS FOR COMP EN

Semester Hours: 3

Introduction to the fundamental concepts in continuous and discrete signals and systems, and methods of signal and system analysis for computer engineers. No credit for EE or OPE students. Prerequisites: EE 213 and MA 238.

CPE 399 - CPE MENTORING II

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisites: CPE 299 and CPE 212.

CPE 412 - INTRO TO PARALLEL PROGRAMMING

Semester Hours: 3

Introduction to processing in parallel and distributed computing environments. Design and analysis of parallel algorithms. Parallel programming environments: Pthreads for shared memory multiprocessor systems and PVM/MPI for distributed networked computers. (Same as CPE 512) Prerequisites: CPE 212 and CS 317.

CPE 423 - HARDWARE/SOFTWARE CO-DESIGN

Semester Hours: 3

Study and design of Systems On A Chip (SOC). Emphasis on Field Programmable realizations of SOC systems. (Same as CPE 523) Prerequisites: CPE 322 and CPE 426.

CPE 426 - VLSI HARDWARE DESC LANG/MODL/S

Semester Hours: 3

Modern VLSI design techniques and tools, such as silicon compilers, (V)HDL modeling languages, placement and routing tools, synthesis tools, and simulators. Students will design, simulate, and layout using both programmable logic families and ASIC libraries. (Same as CPE 526) Prerequisites: EE 202 and EE 315.

CPE 427 - VLSI DESIGN I

Semester Hours: 3

Introduction to VLSI design using CAD tools, CMOS logic, switch level modeling, circuit characterization, logic design in CMOS, systems design methods, test subsystem design, design examples, student design project. Laboratory required. (Same as CPE 527) Prerequisites: EE 202 and EE 315.

CPE 427L - LABORATORY

Semester Hours: 0

Students enrolling in CPE 427L must enroll concurrently in CPE 427.

CPE 431 - INTRO COMPUTER ARCHITECTURE

Semester Hours: 3

Study of existing computer structures. Computer organization with emphasis on busing systems, storage systems, and instruction sets. Performance models and measures, pipelining, cache and virtual memory, introduction to parallel processing. (Same as CPE 531) Prerequisites: CPE 322 and CPE 323.

CPE 434 - OPERATING SYSTEMS

Semester Hours: 3

Study of the fundamentals of operating systems. Emphasis on processes, file management, interprocess communication, input-output, virtual memory, networking and security. Course must be taken concurrently with CPE 435. Prerequisites: CPE 221 and CPE 353/.

CPE 435 - OPERATING SYSTEMS LABORATORY

Semester Hour: 1

Laboratory component of Operating Systems course. Experiments include implementation of device drivers, process and thread management, virtual memory management, dynamic memory management, file-systems. Students must take this course concurrently with CPE 434.

CPE 436 - INTERNALS OF MODERN OPER SYS

Semester Hours: 3

In-depth study of the design of modern operating systems such as Unix, NT and Linux. Emphasis on the internals and implementation details of interrupt processing, real-time clocks, device independent I/O, process management, memory management, file management. (Same as CPE 536) Prerequisite: CPE 434.

CPE 449 - INTRO TO CYBERSECURITY ENGINRG

Semester Hours: 3

Introduction to cryptography and computer security through hardware and physical security to a knowledge of audit methods, security management, and public law. Includes skills such as business process analysis, software security, IAE evaluation, and IAE testing. (Same as CPE 549) Prerequisite: CPE 348 or CPE 448.

CPE 449L - INTRO CYBERSECURITY ENG LAB

Semester Hours: 0

Students enrolling in CPE 449 must enroll concurrently in CPE 449L.

CPE 453 - SENIOR SOFTWARE STUDIO

Semester Hours: 3

Basic concepts of software engineering. Software project management including specifications, design, implementation, testing and documentation. Software design and management tools. Includes a multi-student software project. Prerequisites: CPE 353 and CS 317.

CPE 455 - SECURE SOFTWARE DEVELOPMENT

Semester Hours: 3

Overview of methodologies for development of high-assurance software. Major topics include analysis of security and safety risks, software certification criteria, the software development lifecycle, risk mitigation, design and coding best practices, verification techniques, and auditing of software for insecure and unsafe coding constructs. Prerequisites: CPE 353 or CS 307.

CPE 457 - SOFTWARE REVERSE ENGINEERING

Semester Hours: 3

This course provides fundamental knowledge of software reverse engineering. The course provides the ability (a) to understand software of unknown origin or software for which source code is unavailable, (b) to determine how something works, (c) to discover data used by software, and (d) to aid in the analysis of software. The course introduces tools for reverse engineering, including disassemblers, debuggers, monitors, virtual machines and modern tools for software analysis. Prerequisites: CPE 353 or CS 307.

CPE 459 - SYSTEMS SECURITY

Semester Hours: 3

This course (1) introduces cyber physical, industrial control, embedded, and Supervisory Control and Data Acquisition (SCADA) control systems, (2) examines common vulnerabilities and threats associated with these systems, and (3) examine techniques to defend these systems from cyber-attacks. Prerequisite: CPE 348 and CPE 449.

CPE 488 - CYBERSECURITY ENG CAPSTONE I

Semester Hours: 3

Students will participate in a team based cybersecurity project which is a culminating experience for the cybersecurity degree. For a target system, students teams will conduct and document a risk assessment, then design, implement, and test cybersecurity controls to mitigate threats to the system. Prerequisites: CS 465, CE 440, IS 450, and CPE 399.

CPE 490 - SPECIAL TOPICS IN COMP ENGR

Semester Hours: 1-3

Topics will vary. The course may be repeated when topics vary. Consent of advisor.

CPE 490L - SPECIAL TOPICS LABORATORY

Semester Hours: 0

CPE 495 - COMPUTER ENGINEERING DESIGN I

Semester Hours: 3

First course in the senior capstone design sequence. Application of techniques to the design of electronic systems that have digital hardware and software components. Application of engineering courses to solve real-world design problems. Must be taken in the same academic year as CPE 496. Prerequisites: CPE 323, CPE 353, EE 315, EE 322 and EE 399.

CPE 496 - COMPUTER ENGINEERING DESIGN II

Semester Hours: 3

Second course in the senior capstone design sequence. Must be taken in the same academic year as CPE 495. Prerequisite: CPE 495.

CPE 497 - COMPUTER ENGR INTERNSHIP

Semester Hours: 1-3

Active involvement in an engineering project in an engineering enterprise, professional organization, or government agency that has particular interest and relevance to the student. Junior/senior standing and approval from Engineering Faculty advisor.

CPE 498 - CYBERSECURITY CAPSTONE

Semester Hours: 3

Students will participate in a team based cybersecurity project which is a culminating experience for the cybersecurity degree. For a target system, student teams will conduct and document a risk assessment, then design, implement, and test cybersecurity controls to mitigate threats to the system.

Prerequisite: CPE 488. Prerequisite w/ concurrency: CPE 459.

CPE 499 - PROJECT IN COMPUTER ENGRG

Semester Hours: 3

Individual design project under the direction of an ECE faculty member. Senior standing and permission of instructor required.