CPE 64. Introduction to Logic Design. 4 Units
Prerequisite(s): CSC 15 or CSC 25 or ENGR 50.
General Education Area/Graduation Requirement: Understanding
Personal Development (E)
Term Typically Offered: Fall, Spring, Summer

Covers the following topics: logic gates, binary number system,
conversion between number systems, Boolean algebra, Karnaugh maps,
combinational logic, digital logic design, flip-flops, programmable logic
deVICES (PLDs), counters, registers, memories, state machines, designing
combinational logic and state machines into PLDs, and basic computer
architecture. Lab emphasizes the use of software equation entry design
tools, the use of of schematic entry, and the use of a logic simulation
design tool. Lab assignments are design-oriented. Lecture three hours;
laboratory three hours.
Cross listed: EEE 64

CPE 64W. Introduction to Logic Design Workshop. 1 Unit
Corequisite(s): CPE 64.
Term Typically Offered: Fall, Spring

Designated to assist students in developing a more thorough
understanding of logic simulation and logic design. Focus is on problem
solving and design. Activity two hours.
Cross Listed: EEE 64W; only one may be counted for credit.
Credit/No Credit

CPE 138. Computer Networking Fundamentals. 3 Units
Prerequisite(s): CSC 35, CSC 60, CSC 130. Not currently enrolled in CSC/
CPE 138.
Term Typically Offered: Fall, Spring

Overview, structure, models, concepts, principles and protocols of
computer networking. Network architecture, ISO/OSI reference model,
TCP/IP protocol stack, layering. Protocol, encapsulation, socket. HTTP,
FTP, SMTP, DNS, P2P, TCP, UDP. Multiplexing and demultiplexing, reliable
data transfer, flow control, congestion control. Internet addressing,
routing, forwarding, IP, ICMP. Error detection and correction, multiple
access problem, LAN vs WAN, Ethernet, ARP, switching. Wireless
standards. Network security, threats and attacks, defense and
countermeasures.
Cross Listed: CSC 138; only one may be counted for credit.

CPE 142. Advanced Computer Organization. 3 Units
Prerequisite(s): CSC 137 or CPE 166 and CPE 185.
Term Typically Offered: Fall, Spring

Design and performance issues of computers. Instruction set
architecture, computer arithmetic, processor design, survey of
contemporary architectures, interfacing I/O devices, hierarchal memory
design and analysis, parallelism and multiprocessing, distributed
systems, techniques for enhancing performance, and an introduction
to EDA tools for design and verification of computers. Design and
simulation of a microcomputer in an HDL.
Note: Open to students with full CSC or CPE major standing only. Cross
Listed: CPE 142; only one may be counted for credit.

CPE 144. Dsp Architecture Design. 3 Units
Prerequisite(s): CPE 142.
Term Typically Offered: Fall, Spring

Fundamental principles of Digital Signal Processing (DSP): sampling
theory, aliasing effects, frequency response, Finite Impulse Response
filters, Infinite Impulse Response filters, spectrum analysis, Z transforms,
Discrete Fourier Transform, and Fast Fourier Transform. Emphasis on
hardware design to achieve high-speed real and complex multiplications
and additions. Pipelining, Harvard, and modified Harvard architectures
are included. Concludes with architectural overviews of modern DSP
applications: modems, speech processing, audio and video compression
and expansion, and cellular.

CPE 151. CMOS and Digital VLSI Design. 3 Units
Prerequisite(s): CPE 64 and EEE 108.
Term Typically Offered: Fall, Spring

Introduction to CMOS logic gates and the design of CMOS combinational
and sequential functions at the gate level, including CMOS memory.
CMOS transistor theory is covered including: DC equations, threshold
voltage, body effect, subthreshold region, channel length modulation,
tunneling, and punch through. A basic exposure to VLSI includes: CMOS
processing technology, layout, and CMOS logic design including power,
delay and timing considerations. Students will use industry standard
Computer Aided Design tools to verify designs and layouts.

CPE 153. VLSI Design. 3 Units
Prerequisite(s): CPE 151.
Term Typically Offered: Fall, Spring

Review basic CMOS VLSI technology, circuit characterization and
performance estimation, and provides detailed information on synthesis,
placing and routing, clocking strategies, quality and reliability, and I/O
structures. Design examples, design techniques, and testing techniques
will be presented via current EDA design tools. Students assigned one
project from concept design through validation.

CPE 159. Operating System Pragmatics. 3 Units
Prerequisite(s): CSC 139.
Term Typically Offered: Fall, Spring

Application of operating system principles to the design and
implementation of a multi-tasking operating system. Students will write
an operating system for a computer system. Topics include scheduling
of processes, control and allocation of computer resources and user
interfacing.
Cross Listed: CSC 159; only one may be counted for credit.

CPE 166. Advanced Logic Design. 4 Units
Prerequisite(s): CPE 64, ENGR 17.
Term Typically Offered: Fall, Spring

VHDL and Verilog Hardware Description Languages are studied and
used on the following advanced level logic design topics: synchronous
state machines, asynchronous state machines, metastability, hazards,
races, testability, boundary scan, scan chains, and built-in self-tests.
Commercial Electronic Design Automation (EDA) toolsets are used to
synthesize lab projects containing a hierarchy of modules into Field
Programmable Gate Arrays (FPGAs). Post synthesis simulations by these
same tools verify the design before implementation on rapid prototyping
boards in the lab.
CPE 185. Computer Interfacing. 4 Units
Prerequisite(s): CPE 64, CSC 35 and CSC 60.
Term Typically Offered: Fall, Spring

Design of microcomputer systems including memory systems, parallel
and serial input/output, timer modules, and interrupt structures;
designing 'C' language code, in laboratory, to exercise interface modules
of parallel and serial input/output, timer modules, and interrupts;
extensive study of interrupt handlers, assemblyers, linkers, and loaders.
Practical features of interfaces, handshaking techniques, displays,
keypads, and trackballs are included.

CPE 186. Computer Hardware System Design. 3 Units
Prerequisite(s): CPE 185 or EEE 174.
Term Typically Offered: Fall, Spring

Study of Intel and Motorola architectures, bus structures, interrupts,
memory interface and controllers, bus arbitration, DMA controllers, I/O
interface, bridges and microcontroller. Electromagnetic compatibility and
regulations, cabling and shielding, grounding, digital circuit noise and
layout.

CPE 187. Embedded Systems Design. 3 Units
Prerequisite(s): CPE 185 or EEE 174.
Term Typically Offered: Fall, Spring

Introduction to embedded systems with applied projects. The ISA,
memory map, register architecture and configuration for one processor
are studied in depth. Topics include: Overview of embedded systems;
hardware, firmware, and software design; interrupt programming;
application of contemporary interfacing protocols like USB and
Bluetooth; use of an integrated development environment (IDE) for
development; functional debugging; Real Time Operating Systems
(RTOS) considerations and scheduling. One two hour lecture and one
three hour lab per week.

CPE 190. Senior Design Project I. 2 Units
Prerequisite(s): CPE 166, CPE 187, EEE 108
Corequisite(s): CPE 142
Term Typically Offered: Fall, Spring

Centers on developing hardware and software project planning and
engineering design skills. Emphasis is placed on design philosophies,
problem definition, project planning and budgeting, written and oral
communication skills, working with others in a team arrangement,
development of specifications and effective utilization of available
resources. Lecture one hour per week, laboratory three hours per week.

CPE 191. Senior Design Project II. 2 Units
Prerequisite(s): CPE 190, and (GWAR Certification before Fall 09, or WPJ
score of 70+, or at least a C- in ENGL 109M or ENGL 109W).
Term Typically Offered: Fall, Spring

Continuation of CPE 190. Students are expected to continue the project
started by design teams in CPE 190. The hardware will be completed,
tested and redesigned if necessary. At the same time, software for the
project will be finished and debugged. The final results of the team
project will be presented to the CPE faculty and students at a prearranged
seminar. Lecture one hour, laboratory three hours.

CPE 195. Fieldwork in Computer Engineering. 1 - 15 Units
Prerequisite(s): Petition approval by Program Coordinator.
Term Typically Offered: Fall, Spring

Directed observations and work experience in computer engineering
with firms in the industry or public agencies. Supervision is provided by
the instructional staff and the cooperating agencies. Faculty approval
required.
Note: May be repeated for credit.
Credit/No Credit

CPE 195A. Professional Practice. 1 - 12 Units
Prerequisite(s): Instructor permission.
Term Typically Offered: Fall, Spring

Supervised employment in a professional engineering or computer
science environment. Placement arranged through the College of
Engineering and Computer Science. Requires satisfactory completion of
the work assignment and a written report.
Credit/No Credit

CPE 195B. Professional Practice. 1 - 12 Units
Prerequisite(s): Instructor permission.
Term Typically Offered: Fall, Spring

Supervised employment in a professional engineering or computer
science environment. Placement arranged through the College of
Engineering and Computer Science. Requires satisfactory completion of
the work assignment and a written report.
Credit/No Credit

CPE 195C. Professional Practice. 1 - 12 Units
Prerequisite(s): Instructor permission.
Term Typically Offered: Fall, Spring

Supervised employment in a professional engineering or computer
science environment. Placement arranged through the College of
Engineering and Computer Science. Requires satisfactory completion of
the work assignment and a written report.
Credit/No Credit

CPE 199. Special Problems. 1 - 3 Units
Prerequisite(s): Instructor permission.
Term Typically Offered: Fall, Spring

Individual projects or directed reading.
Note: Open only to those students who appear competent to carry on
individual work. Admission to this course requires approval of the faculty
member under whom the individual work is to be conducted, in addition
to the approval of the advisor. May be repeated for credit.
Credit/No Credit

CPE 201. Research Methodology. 2 Units
Prerequisite(s): Graduate standing or instructor permission.
Term Typically Offered: Fall, Summer

Immersion in the discourse of Computer Engineering: genres, literacies,
stylistic conventions, research methodology. Collective and individual
study of selected issues and problems relating to fields of study in the
Computer Engineering. Orientation to the requirements for the master's
degree culminating experience.
Note: Must be taken in the first semester of the graduate program.
Credit/No Credit
CPE 273. Hierarchical Digital Design Methodology. 3 Units
Prerequisite(s): CSC 205, EEE 285 or their equivalents.
Term Typically Offered: Fall, Spring

Advanced logic modeling, simulation, and synthesis techniques. Topics include modeling, simulation, and synthesis techniques, using Hardware Description Language (HDL's), Register Transfer Level (RTL) representation, high level functional partitioning, functional verification and testing, computer-aided logic synthesis, logical verification and testing, timing and delay analysis, automated place and route processes, and design with Application Specific Integrated Circuits (ASICs) and programmable logic.

CPE 274. Advanced Timing Analysis. 3 Units
Prerequisite(s): EEE 273, CSC 273, CPE 273 or instructor permission.
Term Typically Offered: Fall, Spring

Timing analysis of Application Specific Integrated Circuit (ASIC) designs: Topics include ASIC design methodology, static timing analysis, timing design constraints, design reports, clock timing issues, timing exceptions, operating conditions, hierarchical analysis, analyzing designs with asynchronous logic, performance measurement and power issues. Cross-listed: EEE 274; only one may be counted for credit.

CPE 280. Advanced Computer Architecture. 3 Units
Prerequisite(s): CSC 205, fully classified graduate status.
Term Typically Offered: Fall, Spring

Introduction to parallel architecture covering computer classification schemes, fine and coarse grain parallelism, processor interconnections, and performance issues of multiprocessor systems. Includes parallel and pipelined instruction execution, structure of multiprocessor systems, memory hierarchy and coherency in shared memory systems, programming issues of multiprocessor systems, arithmetic pipeline design, and design for testability.

CPE 296T. Digital Speech Processing. 3 Units
Prerequisite(s): EEE 181 or instructor permission.
Term Typically Offered: Fall, Spring

The objective of this course is to cover the digital processing of speech signals. Topics include speech production and perception, speech processing in the time frequency domains. Short-time energy and Short-time Fourier analysis, homomorphic and linear predictive coding methods. Also covered are speech coding, basic introduction of text-to-speech synthesis and speech recognition. Cross-listed: EEE 296T.

CPE 299. Special Problems. 1 - 3 Units
Prerequisite(s): Instructor permission.
Term Typically Offered: Fall, Spring

Open to qualified students who wish to pursue problems of their own choice. Projects must have approval and supervision of a faculty advisor.

CPE 500. Culminating Experience. 5 Units
Prerequisite(s): Advanced to candidacy and graduate coordinator's permission.
Term Typically Offered: Fall, Spring

Completion of a thesis or project approved for the master's degree. Note: May be repeated for credit.