CMPE 640: Advanced VLSI Design Credits: 3
This course introduces the CMOS VLSI design process and focuses on design at the circuit and physical levels. Students design, implement, fabricate and test basic logic gates and other VLSI structures such as adders and multipliers using computer aided design tools and laboratory test and measurement equipment. Basic layout and simulation techniques are covered in addition to CMOS processing technology, MOS transistor theory, performance estimation, CMOS design styles, VLSI structures and timing issues. The Verilog hardware description language is used in the laboratories.

CMPE 641: Advanced VLSI Design II Credits: 3
This course is focused on the design, implementation, fabrication and testing of a large VLSI chip. Advanced CMOS design topics are covered including BiCMOS and dynamic logic circuits, system level design entities such as ALUs, Register Files, Functional Units, Controllers, and clock and power distribution schemes. The Verilog high-level description language and high-level synthesis tools are also covered as well as Design-For-Testability design issues. Students work in groups of four to design, implement and test a CMOS implementation of a system level design entity such as a microprocessor.
Prerequisite: CMPE 640

CMPE 642: Principles of Mixed Signal Design Credits: 3
This course covers both the practical and theoretical aspects of mixed-signal design the integration of digital and analog circuitry with computer systems, and digital signal processing systems. The course content includes discussion of oversampling techniques, delta-sigma data converters, custom analog and digital filter design, design with submicron CMOS processes.
Prerequisites: CMPE 640

CMPE 645: Computer Arithmetic Algorithms and Implementations Credits: 3
Introduction to arithmetic, unconventional fixed-radix number systems, sequential algorithms for multiplication and division, binary floating point numbers, fast addition and multiplication, fast division and square root, evaluation of elementary functions (polynomial/rational function methods as well as CORDIC), logarithmic and residue number representations. Other topics are covered in articles from current literature in the area.

CMPE 646: VLSI Design Verification and Test Credits: 3
This course covers the design verification and testing processes applied to VLSI digital integrated circuits. Design and hardware level testing and failure analysis processes are examined in detail. Hardware testing concepts covered include fault modeling, fault simulation, automatic test pattern generation (ATPG), functional test, logic and parametric testing techniques. Built-in self test, design for testability, sequential test generation issues are also examined. Commercial computer aided verification and ATPG tools are used to generate tests on existing designs.
Corequisite: CMPE 640

CMPE 650: Digital Systems Design Credits: 3
This course covers practical and theoretical aspects necessary to design high-speed digital systems. Topics include transmission line theory, cross-talk and non-ideal transmission line effects on signal quality and timing, impact of packages, vias and connectors on signal integrity. Other issues covered include non-ideal return paths, simultaneous switching noise, power delivery, buffer modeling and digital timing analysis. Linux device driver design and implementation will also be covered.
CMPE 691: Special Topics in Computer Engineering Credits: 1-3
A set of CMPE 691 courses, on various Computer Engineering specialized topics, are typically offered each semester.

CMPE 698: Research Project in Computer Engineering Credits: 1-3
Individual projects on a topic in Computer Engineering. The project will result in a scholarly paper, which must be approved by the student’s research advisor and read by another graduate faculty member. Required for non-thesis M.S. students. Note: May be taken for repeated credit up to a maximum of three credits.
Prerequisite: Completion of the core and breadth courses or consent of advisor.

CMPE 699: Independent Study in Computer Engineering Credits: 1-3
Independent study work will consist of individualized research work with a faculty member.

CMPE 799: Master's Thesis Research Credits: 1-6
This course is for students in the CMPE master’s program who are engaged in master’s thesis research. Note: May be taken for repeated credits, but a maximum of six credit hours may be applied toward master’s thesis-option requirements. Prerequisite: Open only to CMPE thesis-option students.

CMPE 898: Pre-Candidacy Doctoral Research Credits: 1-6
Research on doctoral dissertation conducted under the direction of a faculty advisor before candidacy.

CMPE 899: Doctoral Dissertation Research Credits: 6
This dissertation research course is for doctoral students who have passed the Ph.D. preliminary examination or will be taking the preliminary examination in the semester they are enrolled in this course. Note: May be taken for repeated credits (two semesters required), up to 16 credit hours.