

Master of Science in Computer Engineering

Comparison of Current and Revised Programs

CURRENT REQUIREMENTS (36 units, 12 courses):	REVISED REQUIREMENTS (30 credits, 10 courses):
<p>GROUP 1: Core courses, Choose 3-out-of-4 EL 536 Principles of Communication Networks EL 547 Introduction to VLSI Design EL 549 Advanced Hardware Design (VHDL) CS 613 Computer Architecture I 9 units</p>	<p>GROUP 1: Core courses, Choose 3-out-of-4 EL 5363 Principles of Communication Networks EL 5473 Introduction to VLSI design EL 5493 Advanced Hardware Design (VHDL) CS 6133 Computer Architecture I 9 credits</p>
<p>GROUP 2: Two sequences, each with two courses. 6-12 units</p>	<p>GROUP 2: Two sequences, each with two courses, 6-12 credits</p>
<p>GROUP 3: approved electives from graduate offerings in EL, CS and, occasionally, pertinent courses from other departments. 12-18 units</p>	<p>GROUP 3: Approved electives from graduate offerings in EL, CS and, occasionally, pertinent courses from other departments. 6-12 credits</p>
<p>GROUP 4: a project that relates to computer engineering and approved by an adviser. 3 units</p>	<p>GROUP 4: a project that relates to computer engineering and approved by an adviser. 3 credits</p>
<p>Thesis option: A 9-unit thesis may be selected and used to replace: (1) either a one-year sequence from Group 2 or two electives from Group 3 and (2) the 3-unit project EL 995 from Group 4</p>	<p>Thesis option: A 6-credit thesis may be selected and used to replace: (1) the 3-credit project from Group 4 and (2) one elective from Group 3</p>
<p>At least 21 units should be EL units and 9 units should be CS units.</p>	<p>At least 18 credits should be EL credits and 6 credits should be CS credits.</p>
<p>GPA requirement: GPA among core and sequence courses ≥ 3.0; GPA among all courses ≥ 3.0.</p>	<p>GPA requirement: GPA among core and sequence courses ≥ 3.0; GPA among all courses ≥ 3.0.</p>

THE MASTER OF SCIENCE IN COMPUTER ENGINEERING

Revised 30 Credit Program Description, Effective Fall 2007

The MS in Computer Engineering educates professionals in computer engineering by offering graduate courses that meet the current and projected needs of industry and government in the metropolitan New York area. The program promotes computer engineering through basic and applied research carried out by faculty and students in collaboration with industry and government agencies.

Polytechnic's MS program in Computer Engineering targets two important needs: (1) as a terminal degree for students intending to round out their education and seek employment and (2) as the tools and background necessary to carry out self-directed research for students planning a PhD. Outstanding students should apply for financial aid in the form of research fellowships, teaching fellowships or partial tuition remission. Students wishing to continue graduate study toward a PhD in Computer Engineering may do so in the Electrical Engineering Program.

The electrical engineering and computer science faculty's research and teaching interests in computer engineering include computer networks, VLSI design and CAD, verification and testing of VLSI systems, embedded systems design and computer architecture. The MS in Computer Engineering focuses on the principles and concepts underlying the design and integration of hardware and software components and systems.

The needs of modern society for sophisticated and efficient electronically controlled systems and devices are increasing exponentially. Advanced studies in computer engineering provide a needed bridge between the University and industry. The Department of Electrical and Computer Engineering is committed to developing and administering a topnotch academic and research program in computer engineering with strong focus on telecommunications, computer networks and microelectronics.

GOALS AND OBJECTIVES

The MS program in Computer Engineering prepares graduates to practice computer-engineering profession at an advanced level. The program's specific goals and objectives provide students with the following:

- The opportunity to specialize in one of the primary sub disciplines of computer engineering (VLSI, High Speed Networking, etc.), or to achieve breadth across a number of the sub disciplines
- Analysis and design knowledge necessary to design general purpose as well as specialized, application-specific computer hardware
- The knowledge and skills to design embedded software-hardware systems
- Exposure to state-of-the-art computer engineering techniques and technologies such as new computer architectures and design styles
- A basis for continued lifelong learning in the computer engineering profession

ADMISSION REQUIREMENTS

Admission to the MS program requires a bachelor's degree in computer engineering, electrical engineering or computer science from an accredited institution. Students not meeting these requirements are considered for admission on an individual basis and may be admitted subject to the completion of

appropriate courses to remove any deficiencies in preparation. Topics in which deficiencies must be removed include logic circuits design, state analysis and synthesis techniques, computer architecture, data structures and algorithms and C or C++ programming.

DEGREE REQUIREMENTS

To satisfy the requirements for a MS degree, students must complete a total of 30 credits as described below. Of these, at least 18 credits should be EL credits and at least 6 credits should be CS credits.

GROUP 1: Core courses: Choose 3 out of following

EL 5363 Principles of Communication Networks

EL 5473 Introduction to VLSI design

EL 5493 Advanced Hardware Design (VHDL)

CS 6133 Computer Architecture I

9 credits

GROUP 2: Two sequences each containing two courses; one course in each sequence may be a core course in Group 1. Both sequences must be in EL or CS courses and at least one must be an EL sequence. Approved course sequences are provided in the ECE Graduate Student Manual.

6-12 credits

GROUP 3: Approved electives may be chosen with adviser approval from graduate offerings in EL, CS and, occasionally, pertinent courses from other departments. With adviser approval, students may select other groups or individual courses provided they relate to the various facets of computer engineering.

6-12 credits

GROUP 4: Students must take a project (EL9953) that relates to the computer engineering discipline and is approved by an adviser.

3 credits

Minimum Total:

30 credits

Thesis option: A 6-credit thesis (EL997x) may be selected and used to replace: (1) one elective from Group 3 and (2) the 3-credit project from Group 4.

A GPA of ≥ 3.0 is required in all graduate courses taken at Polytechnic, except those used for the undergraduate degree. No more than 9 of 30 credits may be taken outside Polytechnic. Also, such credits are not used in computing the GPA. An average of 3.0 is also required in the courses taken to satisfy groups 1 and 2 above. These courses must all be taken at Polytechnic. If some of these courses are excused because they were taken as part of an undergraduate program or were awarded transfer credits, substitute courses approved by the adviser are used in calculating this average. In any case, a total of 30 credits are required for the degree. Students should consult the Department of Electrical and Computer Engineering Graduate Student Manual (www.poly.edu/ece/graduate/menu.php) for more detailed rules and procedures, including student status, transfer credits, recommended electives and one-year sequences, current areas of research and disqualification for low grades.

Catalog Descriptions of Core Courses

EL5363 Principles of Communication Networks

This course covers all the fundamental aspects of communications networks. Topics being discussed are: protocol architecture, data transmission and signal encoding, multiplexing, spread spectrum, data link control, local area networks, wireless LAN, circuit switching, packet switching, routing, traffic control, Internet protocol, transport layer protocol, application design and the basics of network security.

Prerequisites: MA3012 or instructor's permission

EL 5473 Introduction to VLSI Design

This course will cover CMOS processing technology, MOS transistor theory, static/dynamic circuit and logic design techniques, circuit performance estimation, standard cells and gate arrays, clocking strategies, input/output structures, datapath, memory, and control logic design. Advanced VLSI CAD tools will be used for schematic capture, layout, timing analysis, and simulations for functionality and performance. **Prerequisite:** Senior or Graduate Status, CS 2204 & EE 3114 or equivalent

EL5493 Advanced Computer Hardware Design

This course will show how a hardware description language (for example, VHDL) can be used for computer hardware modeling, logic synthesis, register-level synthesis and simulation. The resulting design with hundreds or thousands of gates is then ready to be downloaded to form FPGA chips or silicon cells. We plan to use programs such as QuickVHDL, modeling and simulation tools from Mentor Graphics or similar large-scale programs. A design project is required, and students will make a written and oral presentation. **Prerequisite:** CS 1124, CS 2214 and EE 2024

Note: description for CS6133 can be found in program description of Computer Science graduate program.