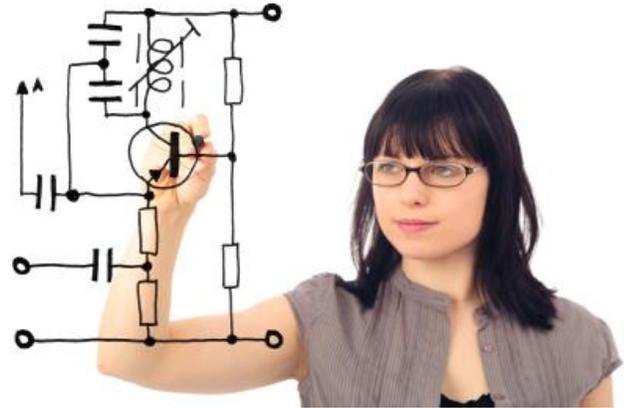# Computer Engineering

What can I do with a degree in Computer Engineering?

Computer engineers analyze and develop computer systems, both hardware and software. They might work on system such as a flexible manufacturing system or a "smart" device or instrument. Computer engineers often find themselves focusing on problems or challenges which result in new "state of the art" products, which integrate computer capabilities. They work on the design, planning, development, testing, and even the supervision of manufacturing of computer hardware -- including everything from chips to device controllers.

They work on the interface between different pieces of hardware and strive to provide new capabilities to existing and new systems or products. The work of a computer engineer is grounded in the hardware -- from circuits to architecture -- but also focuses on software and how it interfaces with hardware. Computer engineers must understand logic design, microprocessor system design, computer architecture, computer interfacing, and continually focus on system requirements and design. It is primarily software engineers who focus on creating the software systems used by individuals and businesses, but computer engineers may also design and develop some software applications.

What additional skills will I need as a Computer Engineering professional?

Computer engineering professionals need to be able to analyze and synthesize information when designing systems that integrate hardware and software. Good attention to detail is also extremely important when working with complex systems. Computer engineers must be able to devise creative solutions to the problems with which they are tasked. Computer engineers often work in teams so they need to be able to work and communicate effectively with others.

What can I expect during my undergraduate studies in Computer Engineering?

When enrolled in an undergraduate program in computer engineering, students should expect to take a mix of courses that teach technological, engineering, mathematical, business, and interpersonal skills. Computer engineering programs may have a focus on hardware or software or a combination of the two.

Sample undergraduate coursework in Computer Engineering may include topics such as:

- Programming
- Computer architecture
- Digital logic
- Distributed systems
- Embedded systems
- Security
- Operating systems
- Algorithms

- Requirements analysis
- Software design
- Calculus
- Project management
- Digital signal processing
- Probability and statistics
- Circuits and systems
- Electrical/electronic/systems engineering

- Physics
- Testing
- Interpersonal communication
- Law/ethics
- Discrete mathematics
- Team projects

How can I start preparing now for Computer Engineering studies?

There are a number of ways that pre-university students can begin preparing for undergraduate studies in Computer Engineering. In terms of coursework, it is extremely helpful to have at least four years of mathematics courses, including Calculus, and two years of science courses. Courses in programming, business, communication, engineering, accounting, and foreign language can also be very useful.

Pre-university students should also consider involvement in out-of-school time activities to further explore their interest in computing. Students' own schools may offer computing activities as a part of afterschool courses or clubs. There are numerous local, national or global competitions, projects, and fairs available which enable students to gain valuable skills and experience in computing. Many local universities have summer or weekend programs designed to provide students with hands-on experience in computing. Some universities even allow pre-university students to take courses that will earn them credit before even entering university. There are also a number of online tools or even courses that allow students to practice computing skills such as programming. More and more pre-university students are also getting involved with internships, volunteer work, or research projects at local universities, non-profits, or businesses to gain experience and connect with other students and mentors.

Additional resources

- Sloan Career Cornerstone Center's Computer Engineering site
- ACM Careers Brochure

References: [ACM 2005] ACM/IEEE-CS Joint Task Force on Computing Curricula, Computing Curricula 2005: The Overview Report, April 2005. (http://www.acm.org/education/curricula.html)

Some of the content included in this profile was provided by the Sloan Career Cornerstone Center (www.careercornerstone.org).

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