

## Software Engineering

### What can I do with a degree in Software Engineering?

The explosive impact of computers and information technology on our everyday lives has generated a need to design and develop new computer software systems and to incorporate new technologies into a rapidly growing range of applications. The tasks performed by workers known as computer software engineers evolve quickly, reflecting new areas of specialization or changes in technology, as well as the preferences and practices of employers. Computer software engineers apply the principles and techniques of computer science, engineering, and mathematical analysis to the design, development, testing, and evaluation of the software and systems that enable computers to perform their many applications.



Software engineers working in applications or systems development analyze users' needs and design, construct, test, and maintain computer applications software or systems. Software engineers can be involved in the design and development of many types of software, including software for operating systems and network distribution, and compilers, which convert programs for execution on a computer. In programming, or coding, software engineers instruct a computer, line by line, how to perform a function. They also solve technical problems that arise. Software engineers must possess strong programming skills, but are more concerned with developing algorithms and analyzing and solving programming problems than with actually writing code.

### What additional skills will I need as a Software Engineering professional?

Software engineers must have excellent problem solving abilities. These professionals are often responsible for managing design or development projects, so they must have excellent leadership and project management skills. Software engineers must have the vision to see a project through its lifecycle from inception to completion. They also need to be thorough to ensure that software products meet standards of quality. Software engineers must also have strong communication and teamwork skills as they frequently work in team settings.

### What can I expect during my undergraduate studies in Software Engineering?

When enrolled in an undergraduate program in software engineering students should expect to take a mix of courses that teach technological, engineering, mathematical, business, and interpersonal skills.

Sample undergraduate coursework in software engineering may include topics such as:

- Programming/language theory
- Computer/software architecture
- Operating systems
- Human-computer interaction
- Algorithms
- Networking
- Software development/design/ testing
- Information systems
- Database management
- Requirements analysis
- Law/ethics
- Computer engineering
- Risk management
- Distributed systems
- Project management
- Calculus
- Discrete mathematics
- Statistics
- Physics
- Interpersonal communication
- Team projects

## How can I start preparing now for Software Engineering studies?

There are a number of ways that pre-university students can begin preparing for undergraduate studies in software 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 Software 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](http://www.careercornerstone.org)).

