

Majoring in Computer Science

For some fields of study such as philosophy and foreign languages, choosing a major does not simultaneously determine a career path. However, in computer science the two go hand in hand. For that reason, students considering studying computer science should inform themselves about the kind of work computer scientists do and the kind of environments in which they work. They should also review carefully the coursework required to earn the computer science degree, including the amount of programming involved (a lot!!) and the number of mathematics courses to be taken (22 semester hours of calculus and other advanced mathematics).

Aptitudes

Some of the aptitudes and abilities most fundamental to the study of computer science are: the ability to reason abstractly and logically; the ability to analyze and solve problems; the patience, persistence, and self-discipline to carry out detail work; and enough mathematical aptitude to work comfortably and routinely with mathematical concepts and numeric calculations.

Job Settings

Computer scientists work in a variety of types of jobs and environments. Some work in academic settings. They may be either teachers or professors delivering instruction, or they may be programmers or systems administrators programming and managing the extensive computer systems that maintain student records, produce university employee payrolls, support research projects, or track the library's book and journal holdings. Other computer scientists work in government jobs where they develop the military's computer-controlled weapons systems, develop and maintain computer systems for tracking nationwide data dealing with the economy, population growth, and air traffic control, or they computerize systems for the administration of massive programs like Medicare and Social Security. Still other computer scientists work in private industry. There the environment ranges from small operations where one individual may be "the" computer expert for both hardware and software to large corporations employing hundreds or even thousands of computer specialists. These specialists plan new systems; select, install, and maintain hardware; or write programs for everything from billing and inventory tracking to automated factory control and financial planning. They support the business needs of enterprises as large and diverse as Verizon, MITRE, General Electric, Ford Motor, and, of course, the computer industry itself: Microsoft, IBM, Hewlett Packard, and Intel, to name just a few.

Technical Skills, Formal and Practical

No matter where they work, all computer scientists need specific technical skills which are generally acquired through formal coursework. The Virginia Tech undergraduate major in computer science provides extensive hands-on experience in programming and in the use of

both UNIX and at least one other operating system. Additionally, students study the formal concepts that underlie computer science: algorithms, data structures, object-oriented software design, software engineering, and the conceptual underpinnings of operating systems.

Besides formal coursework, students can enhance their permanent job prospects during their undergraduate years by participating in either summer internships or the cooperative education program.

Non-technical Skills

The formal technical knowledge and the programming skills acquired through computer science classes constitute only part of the skills needed to become a successful computer scientist. There are non-technical skills which, over the span of a worker's life are equally, or perhaps more important than the technical ones, since the specific technical material learned in college becomes outdated long before a worker is ready to retire.

Two of the most important skills needed are good oral and written communication skills. As surprising as it may seem, some computer professionals spend over half their time writing prose, not code, and giving oral presentations. They write planning documents for work they will do and reports on work they have done. And since most computer scientists work in teams, they must give frequent oral presentations about their work to their teammates, to other groups in the company with whom their project must be coordinated, and sometimes even to customers outside the company.

Because they so often work in teams, computer scientists also need good social skills. They need to be able to interact well with other team members in a mutual effort to achieve a common goal. They have to feel comfortable going to lunch with a customer or hosting an applicant the company wishes to recruit.

Other non-technical skills of importance to computer scientists are planning and time management. Projects need to be planned, priorities established, and schedules and deadlines met in the work world. The computer scientist who does not bring these skills to her or his job will soon be looking for a new job.

And finally, non-technical skills that rank on a par of importance with good communication skills are the facility and drive to be an independent, life-long learner. These skills are particularly important for a computer scientist, for it is a field that is rapidly and incessantly changing. To work in such a field means that one must continually be learning what is new in the field in order to keep one's knowledge current. And once students leave the university, they will no longer have the benefit of a clearly-defined curriculum with specific courses, required textbooks, and readily available professors to help learn what they need to know. They will have to take the initiative themselves to seek out books, manuals, special training courses, and other continuing education opportunities that can provide the new knowledge they need.

All these non-technical skills needed for the work world can and should be developed while in college. In fact, most of them are skills that will help students be more successful at the

university. Some of the ways to learn these non-technical skills are: taking courses that require papers be written; participating in class discussions and giving oral presentations; joining and taking an active role in student organizations; participating in sessions sponsored by Counseling Services focusing on time management and study skills; and taking a minor in a field such as technical writing, business, or biology to add application specific area skills to formal computer science training.