

Created June 2021



Careers in Computer Science

Contents

Overview

[What is Computer Science?](#)

[Sample Professions](#)

Industries Where CS Graduates Work

[Computer/Software/Telecommunications Companies](#)

[Government](#)

[Banks, Insurance Companies, Retail Chains](#)

[Consulting Firms](#)

[Graphic Design Firms](#)

[Some other industries that hire CS undergrads](#)

Educational Requirements

Program Related Skill

Possible Career Paths with a Computer Science Major

Getting Experience and Building Network:

[Internship](#)

[Side Projects](#)

[ROP](#)

[Teaching Assistant](#)

[Clubs and Societies](#)

[Create a LinkedIn Account](#)

[Professional Organizations](#)

Sample Job Postings

Technical Interview Preparation

[Geeks for Geeks](#)

[Coding Challenge Websites](#)

[Interview Preparation Books](#)

Meet a Computer Scientist

Meet a Web Developer

Meet an IT Project Manager

Sources

Overview

What is Computer Science?

Computer science is the study of computers and computing, including their theoretical and algorithmic foundations, hardware and software, and their uses for processing information. The discipline of computer science includes the study of algorithms and data structures, computer and network design, modeling data and information processes, and artificial intelligence. Computer science draws some of its foundations from mathematics and engineering and therefore incorporates techniques from areas such as queueing theory, probability and statistics, and electronic circuit design. Computer science also makes heavy use of hypothesis testing and experimentation during the conceptualization, design, measurement, and refinement of new algorithms, information structures, and computer architectures.

The major subfields of computer science include the traditional study of computer architecture, programming languages, and software development. However, they also include computational science (the use of algorithmic techniques for modeling scientific data), graphics and visualization, human-computer interaction, databases and information systems, networks, and the social and professional issues that are unique to the practice of computer science. As may be evident, some of these subfields overlap in their activities with other modern fields, such as bioinformatics and computational chemistry. These overlaps are the consequence of a tendency among computer scientists to recognize and act upon their field's many interdisciplinary connections.

Sample Professions

Computer Programmer:

Do you love problem solving? Do you want to make a difference to your community using your passion for Technology? Working as a Computer Programmer might be an ideal choice for you. Computer programmers develop software programs for computers. They are involved in every stage of the process, from writing and testing to maintenance. These programs are detailed guides that tell a computer to perform certain tasks. They're written in special languages that computers can understand. The languages you use depends on the organisation and which sector of the computing or IT industry you work in. Every function on a computer is the work of a piece of software.

Computer Network Specialist:

Computers have completely changed the way we share information now. Network specialists make this sharing possible. They create electronic links between staff and the outside world. The system lets people transfer files quickly and easily. Network specialists have a wide variety of duties. Usually, they design, create, and install computer networks. They also maintain these systems. Their networks can serve from two to several thousand users. Small companies often have only one network specialist on staff. This person handles all of the issues that come up from day to day. Larger companies usually have several people to build a network. Each one focuses on a specific area.

Business Systems Analyst:

Business systems analysts combine computer technology with business knowledge. They research and design systems that make businesses more efficient and cost-effective. Many companies use

Created June 2021

computer systems for more than just basic tasks. For example, retailers use computer programs for many things. They keep track of inventory levels in a cost-effective way. This allows the store to sell its products at a lower price. To create these systems, companies need people who know business practices and computer technology. These experts are called business systems analysts.

Professor:

Professors teach students at colleges and universities. As experts in their subject areas, they conduct research to publish and share with others. They use the knowledge that they have gained in their classrooms as students to enlighten future students about their subject areas. This profession is always related to job security.

Software Engineer:

To do anything on a computer, you need software. Connecting to a network and going online requires software. You need software to write an essay. Playing a video game requires software. Even getting to this profile required several pieces of software. Software engineers create these complex systems. Software engineers research, design, and test computer software. They work on everything from application software to operating systems.

Medical Imaging Tech:

Medical imaging techs produce images of the inside of the body. Doctors use these images to help diagnose medical problems. You can learn a lot about people from photographs. You may be able to tell what job they have, and if they are friendly. You can learn even more about people from pictures of their internal organs. These images can tell you a lot about the body. They show bones, the workings of the nervous system, and signs of illness.

Computer Hardware Engineer:

Do you use a Mac or a PC? Laptop or desktop? Touchscreen or keyboard? We have all these options thanks to computer hardware engineers. They use their knowledge of science and math to design computers and computer components. In addition to computers, engineers create all of the related components. This includes internal parts like circuit boards, chips, and hard drives. But it also includes things like monitors and keyboards.

Inventors:

Inventors are creative people who have great ideas, and they also know how to make them a reality. For example, Alexander Graham Bell invented the telephone. Without this great idea, we might not have email or the internet today. Inventors often think about what people have to do in their daily lives. Then, they figure out how to make these tasks easier.

IT Project Manager:

IT project managers coordinate the activities of professionals who develop computer programs. They make sure projects are finished on time and on budget. IT project managers' first task is to plan the work and budget. This involves identifying all the steps of the process. Then, they figure out how much the required resources will cost. They also estimate how long each step will take. For example, to build a simple computer program, project managers might identify 10 steps. Then, they may estimate that it will take 1,000 hours of work.

Technical Writer:

Technical writers create manuals, reports, and online help tools for clients and customers. They are experts at writing complex information, so it is easier to understand. Electronic products like computers and cameras can be tough to set up and use. The same is true for large machines like photocopiers and printers. Complex products like this tend to come with an instruction manual. The problem is that the technical terms can be hard to understand. Technical writers make these texts easier for people to read and absorb.

Industries where CS Graduates Work

Computer/Software/Telecommunications Companies:

All these companies can be grouped together in one common basket of organizations called Tech Companies. Some common examples of such companies are Google, Amazon, Microsoft, Bell, Telus and Rogers. These companies regularly post job openings for undergraduates who are pursuing Computer Science, Software Engineers, Business Analysts, Computer Engineers and Project Managers are some professions that they actively search candidates for.

Government:

In this era of digitalization, government requires qualified computer science graduates to efficiently produce and maintain software for handling their resources and medium for communication. Working for the government can be a great option for someone who is in search of job stability and a good salary.

Banks, Insurance Companies, Retail Chains:

Some common organizations that hire computer science graduates are TD, BMO, RBC, Scotia Bank, CIBC, Loblaws, Sunlife Insurance, Aviva, President's Choice, Mastercard, VISA, American Express, and many more.

Consulting Firms:

Some common organizations that hire computer science graduates are Accenture, Deloitte Consulting, Archstone Consulting, and many more.

Graphic Design Firms:

Organizations that primarily focus on the fashion industry or digital marketing, often hire computer science undergraduates as Frontend developers. Frontend developers majorly design user interface for software and products.

Some other industries that hire CS undergrads:

- Engineering Firms
- Test Development Companies
- Contract and Temporary Employers
- Health/Medical/Hospitals
- Universities, Colleges and School Boards

Educational Requirements:

The education path you choose depends on the kind of profession that excites you. To be a **software engineer**, you need at least a bachelor's degree in software engineering. A degree in a related subject, like computer science, may also be suitable. Some computer science programs offer an optional software engineering component. Courses like Introduction to Software Engineering (CSC301H5) and Introduction to Web Development (CSC309H5) are some great courses that help you gain the required skills for the industry. However, many Mathematics and Statistics majors also make it to the industry as a Software Engineer depending on their past work experiences, personal projects and the coursework they complete. **Personal or side projects** are great ways to portray what you can develop. Interviewers and recruiters place great importance for the skills that you have demonstrated to complete your projects. A majority of Computer Science graduates dive into the job market directly after completing their bachelors and without pursuing a masters. The reason behind this is the number of opportunities available in the market for Computer Science undergrads.

Professions like **business systems analyst**, require you to complete at least a bachelor's degree. You can get one in either computer science or a business-related field. Economics and commerce are suitable fields of study. Whether you choose to study business or computers, you need to know about the other subject as well. If you get a degree in computer science, you still need to learn about business. Try to take as many business courses as you can while earning your degree. You can also learn more about business practices thorough on-the-job training. If you study business, on the other hand, you need to know about computers. You can take related courses at a college or university. Working as a programmer or computer engineer is also good experience. A master's degree in business administration can help give your career a boost. This degree takes about 2 years to earn. You can also earn the Chartered Professional Accountant (CPA) credential. Many analysts find it is useful in the job market.

On the other hand, a profession like **Computer Hardware Engineer** or **Computer Engineer**, you will need at least a bachelor's degree in computer engineering. A degree in another kind of engineering can also work. But the program must have classes on computer systems. For example, you could study electrical engineering. A bachelor's degree takes 4 years to complete. Many entry-level positions are open to those with a bachelor's degree. You will need a master's degree for more advanced research positions. This takes another 1 to 2 years. To work as a **professor**, you will need a PhD which requires completing a master's degree in relevant fields and taking courses and writing an original thesis.

Program Related Skills:

Technical Skills

Computer Science undergraduates are required to possess a deep understanding of key concepts like data structures, databases, computer programming in languages like Python, C, Java, and many more depending on the position they apply for. A good understanding of mathematical concepts like Calculus and Linear Algebra is also an asset.

Analytical Skills

Being a computer science major involves identifying a problem and coming up with a technological solution to address it. This requires having strong analytical skills that will enable you to understand the issue you are dealing with and evaluate different solutions to find the one that best fits your needs.

Problem-Solving Skills

One of the other key skills for computer science majors is the ability to solve complex problems in a systematic and logical way. This is because most of the projects you will be working on will require you to take a concept and turn it into a reality. To do this, you will need to be able to think about the best way to execute the project and then outline the steps needed to get it done.

Creativity

Creativity goes hand in hand with problem solving and it is one of the other key skills you'll need as a computer science major. Since coming up with solutions to problems is almost never a straightforward process, out-of-the-box thinking is often required to ensure that you are delivering the most innovative and effective solutions.

Critical Thinking

Critical thinking is an important skill to have in any major, but it is especially important when it comes to computer science because you are going to be working on a variety of projects and using a variety of methodologies, so knowing which methodologies to use (and when to use them) is an essential part of getting the job done. By thinking critically, you will also be able to assess why certain solutions might not work and to save time in coming up with the right approach.

Resilience

One of the key tenets of programming (at any level) is understanding that you will most likely face failure at some point before you succeed. This has nothing to do with your programming abilities and everything to do with the process itself. Programming involves trying out different elements of code until you find the best solution and learning to be resilient, determined, and humble in the face of multiple failures is a part of the process.

Possible Career Paths with a Computer Science Major	
<ul style="list-style-type: none">• Computer Engineer*• Computer Network Specialist*• Computer Programmer*• Computer Support*• Computer Trainer*• Database Developer*• Desktop Publisher*• Graphic Designer*• Inventor*• Medical Imaging Tech*• Scientist*• Video Game Developer*	<ul style="list-style-type: none">• Statistician (e.g., work for the census bureau, in health research) *• Operations Research Analyst (e.g., for a courier company) *• Logistics Specialist*• Research Analyst (Financial)*• GIS Specialist*• Lawyer*• IT Project Manager*• Technical Writer*• Software Analyst• Systems Architect / Analyst

<ul style="list-style-type: none">• Web Developer*• Webmaster*• Website Designer*• Multimedia Developer*• Illustrator*• Business Systems Analyst*• Technical Sales Representative*• Corporate Trainer*• Electronics Engineering Technician*• Management Consultant*• Pilot*	<ul style="list-style-type: none">• Information Specialist• Computer Systems Specialist• CSIS- Canadian Security Intelligence Service positions (e.g., Communication Analysts, Intelligence Officers, etc.)• Strategic Planner• Telecommunications Specialist• E-Commerce Specialist• Network Architect• High School Teacher*• Professor*• Industrial Engineering Tech*
<p>* View these titles at Career Cruising, available on CLN under the Resources tab.</p>	

Getting Experience and Building Network:

Internships

An internship is a period of work experience offered by an organization for a limited period of time. A lot of undergraduate Computer Science students often shy away from internship opportunities. Whether the reason is that it is too stressful to handle both school and an internship or they already have a job in an unrelated field, employers want experienced talent, and they do not want excuses. Internships help you develop practical experience by exposing you to real world problems and forcing you to develop solutions for them. Internships show that you have ambition, and you are willing to take an extra step to segregate yourself from usual applicants. You can find internship postings at various job board websites. For Example:

- [LinkedIn](#)
- [Monster Jobs](#)
- [Indeed](#)
- [Glassdoor](#)
- [Angel list](#) (Postings available for start-ups, many unpaid positions)

University of Toronto's Engineering Career Centre also offers an exciting opportunity for gaining extensive work experience, called Personal Experience Year (PEY). Any student enrolled in a Computer Science specialist or major program at UTM, or the St. George campus can participate in this program. This optional program enables undergraduates who have completed their second or third year of study to build meaningful work experience, strengthen their professional networks and enhance their interpersonal and technical competencies. During this period, which lasts 12 to 16 consecutive months, students are full-time employees with a competitive salary. Explore more about this program by clicking [here](#).

Side Projects

A side project is something that you can do, usually during your free time, aside from your main activities. For students, side projects are usually done during the summer or even during the semester. An example of a side project is building a To-Do List web application using JavaScript

Created June 2021

frameworks. Side projects help you demonstrate your ability to write meaningful code and build something through the knowledge you have gained from your courses or additional web resources. They are also a great tool to portray your passion for self-learning and your drive toward new technologies. Click [here](#) to get some cool ideas for your new side project!

Research Opportunity Program

The Research Opportunity Program ([ROP](#)) allows you to work closely with a professor in a research project during your academic year. Students in the program have the valuable opportunity to become involved in hands-on, cutting-edge research, working one-on-one with the University's leading faculty members across a range of academic units. Through the ROP, you will gain practical skills and knowledge that can be applied to careers or toward future graduate studies. You will use your experiences to build strong relationships with instructors, learn about exciting new developments in their research field, and explore new areas of interest.

Teaching Assistant

A teaching assistant is an individual who assists a teacher or a professor with instructional responsibilities. Instructional responsibilities might include preparing course material, conducting tutorials or labs, being present for support during active learning sessions and invigilating midterms or exams. To become a TA, you need to be in good academic standing and be in good terms with the professor who you want to work with. You need to have a good understanding of the material taught for the course you want to be a TA for. Look at [this](#) website to find TA postings for Mathematics, Computer Science and Statistics department.

Clubs and Student Societies Involvement

There are multiple clubs and societies present on campus to gain some relevant experience related to your field of study. These clubs provide students with opportunities to engage with the UTM community and simultaneously put their technical skills to use. They link you up with like-minded individuals and help build healthy and productive relationships with them. Some amazing clubs present at the UTM campus are:

- Mathematical & Computational Sciences Society (MCSS)
- Computer Science Student Community (CSSC)
- Developers Student Community (DSC)
- Women in Computer Science (WiSC)
- UTM Student Society for Algorithmic Modelling (UTMSAM)
- UTM Robotics

Create a LinkedIn Profile

Create a LinkedIn profile to connect with professionals in various fields, explore the career paths of UTM alumni, research employers, apply for specific positions, and more. Need help? Come to the Career Centre to book a LinkedIn profile critique.

Join a Professional Organization

Professional organizations are a great way to build valuable connections during school and after graduation. Some great professional organizations for Computer Science Undergraduates are:

- [Advancing Computing as a Science & Profession](#)
- [The Association for Information Science and Technology \(ASIS&T\)](#)

Created June 2021

- [Association for Women in Computing](#)
- [Institute of Electrical and Electronics Engineers](#)

Sample Job and Internship Postings:

Here is a list of some sample job postings. You can look for related positions on the job board websites mentioned above:

- Software Developer, Google
- Software Development Engineering Inter, Amazon
- Python Developer, Rockstar Games
- Android Developer, Bitmoji, Snapchat
- Network and Systems Administrator, University Health Network
- Network Systems Specialist, Eramosa
- Business Systems Analyst, Ceridian
- Security Business Analyst, City of Mississauga
- Business Analyst, BMO Financial Group
- Assistant Professor – University, University of Guelph
- Professor of Computer Science, Lakehead University
- IT Project Manager, CIBC
- Scrum Master and Project Manager for FX Front Office IT, RBC Capital Markets
- Technical Project Manager – Google Cloud, Pythian
- Senior Technical Security Writer, Blackberry
- Staff Technical Writer – 86442, AMD
- Software Developer – Full Stack, Trapeze Group
- Web Developer, Tata Consultancy Services
- Applied Machine Learning Engineer – 92669, AMD
- Backend Software Engineer, Rider, Uber
- Animated R&D Programmer – Computer Vision and ML
- Hardware and System Engineer (Contract), Huawei
- QA Automation Engineer, Solace
- Electrical Engineer, HEC Group
- Quality Assurance Engineer II, Amazon
- Quality Assurance Analyst, Fishtank Consulting
- Database Developer, Scotiabank
- Database Administrator, City of Mississauga
- SRE – System Engineer I, Thomson Reuters

Technical Interview Preparation:

Cracking a Technical Interview might be an overwhelming process for many computer science students. Technical interviews are typically conducted by employers who are hiring computer science, engineering, IT or other technical professionals. These interviews allow interviewers to assess candidates' technical skills, problem-solving skills, and critical thinking skills. Depending on the interviewer, an interview might either revolve around your solid technical concepts and

Created June 2021

project work or they might ask you a couple of coding problems which you need to solve via live coding platforms. Here are some important resources and tips that you can refer to for preparation.

Geeks for Geeks

Data Structures are one of the most important technical topics that interviewers love to test your skills about. [This](#) website provides you ample of information about various technical topics that interviewers can quiz you about. Feel free to explore this platform and gain as much information as possible.

Coding Challenge Websites

These websites provide you with a variety of coding questions that help you prepare for competitive coding problems that interviewers might ask during a technical interview. Some famous coding challenge websites are:

- [Leetcode](#)
- [TopCoder](#)
- [HackerRank](#)
- [International Collegiate Programming Contest \(ICPC\)](#)
- [CodeChef](#)
- [Geeks Coding Challenge](#)
- [CodeForces](#)

Interview Preparation Books

These books can be really helpful when it comes to revising some key concepts before your dream interview. Whether it is Software Design Patterns, Data Structures or Operating Systems, they have it all. Here are some great books that you can find under the tag of Career Development Resources at the University of Toronto Libraries [website](#).

- Programming Interviews Exposed by Noah Suojanen Kindler; John Mongan; Eric
- 101 Great Answers to the Toughest Interview Questions by Ron Fry

The following “Meet” sections are based on informational interviews available in [Career Cruising](#).

Meet a Computer Scientist

- Tell me about your job. Is what you do different in any way from what others in your occupation do?

I am a professor in the department of computer science at a large university. In addition to teaching, I do research in discrete combinatorial mathematics, which involves using a computer to construct patterns and arrangements with specific properties. Some work is very similar to Sudoku puzzles, and some is related to lottery systems like 6/49. I have also done work in computer and digital music, which involves the creation of computer software that could create and modify synthetic sounds.

My job is different from others in my profession because in addition to computer science research, I am a department head, so I teach and have more administrative work than professors in other areas.

- Can you tell me about your background and how you got into this field?

I became interested in computers as a high school student when I had an opportunity to learn to program them. I also began teaching at an early age, before I left school. As “experts,” a friend and I were asked by the school principal to teach programming to a class of younger students. While in grade 12, we taught a class of grade 10 students. I found that I liked teaching. After high school, I attended the same university I work at now, studying computer science every step of the way. In university, I marked papers, gave tutorials, and eventually taught classes and assisted with some research before becoming a professor.

I progressed through the Bachelor of Science (BSc), Master of Science (MSc), and PhD programs as quickly as I could and then became a professor at the age of 25. My friend who taught the grade 10 class with me is also a computer science professor and department head. There must have been something in the water!

- What are the biggest challenges in your job?

Keeping current with changes in the discipline is the biggest challenge. Finding interesting and productive research ideas, and obtaining the funding to carry them out, is another hurdle.

Meet a Web Developer

- Tell me about your job. Is what you do different in any way from what others in your occupation do?

I am the lead web developer for a social networking site. I primarily do the back-end web development, and some work on the front end as well. My role includes working on the web database, showing content, and writing codes. I work on the web and on a mobile platform.

- Can you tell me about your background and how you got into this field?

I received my master’s degree from a well-known university. I studied entertainment technology and applied computer science. Because I loved playing video games, I went to tournaments and won a regional tournament. I wanted to make games. Eventually, I transitioned into the role of a web developer, working for a startup, and have been doing that for the past year. It was a natural transition for me because of the technical aspect of my previous work.

- Are there many opportunities in your field? What should people do to get started?

Yes, there are opportunities in web developing. Startups and most companies have a need for a web developer to work on a website or a mobile application. The websites are important for the internal and external growth of a company.

A good way to get started is by building a WordPress site for a company or even yourself.

Meet an IT Project Manager

- Tell me about your job. Is what you do different in any way from what others in your occupation do?

I am a senior programs manager. I have worked for the same company for more than 22 years. My job changes as I get new projects to work on. I focus on business analysis, process and tool improvements, new products, and new client transitions. I work with a team of people who have programs that they work on as well.

Created June 2021

My job may be different from that of other project managers in that my experience is in engineering. Our team was handpicked for project management because of the diversity of our work experience.

- Can you tell me about your background and how you got into this field?

I obtained my Bachelor of Science degree from a well-known university and then my Master of Business Administration degree from the same school several years later. Prior to my current role, I worked as a programmer in accounting. I have worked as an engineer, in customer support, as the team lead of strategic clients, as the team lead of a technical team, and as a transition manager. I enjoy what I do and the progression towards project management just happened naturally. I think being flexible and looking out for new programs that interested me helped me get into my current role. One may have to present a business case for a new program but doing so helps to define your value to the company.

- What personal characteristics are required for someone to be successful in your job?

Organizational skills and flexibility are key qualities for a project manager to have. During the course of the day in my job, I have numerous emails to review. I need to figure out which emails to answer and which projects to tackle first. Multitasking capabilities and an ability to speed read are also valuable so that you are more efficient at completing your work. In my role, it is essential to be able to work independently as I have a telecommute position.

Sources

<https://www.linkedin.com/pulse/computer-science-internships-important-heres-why-alejandropalacios/>

<https://www.computersciencedegreehub.com/faq/fundamental-skills-computer-science-major/>

<https://www.bestcomputersciencedegrees.com/faq/what-professional-organization-should-computer-science-majors-join/>

<https://www.wayup.com/guide/types-skills-best-computer-science-major/>