

Undergraduate degrees in Computer Science at BYU

The Discipline

Computer science touches virtually every area of human endeavor. Software is responsible for everything from the control of kitchen appliances to sophisticated climate models used in predicting future environmental change. Students in computer science learn to approach complex problems in business, science, and entertainment using their strong backgrounds in mathematics, algorithms, and data structures.



The Program

The degree programs in the Computer Science Department at BYU prepare students to be confident software developers and technical problem solvers. BYU's computer science graduates are known for solid preparation in the fundamental principles of the discipline. In addition to the core computer science courses, students are given the opportunity to broaden their analytical and scientific skills by doing work in physics, statistics, and mathematics. This knowledge is then applied as students study the deep theoretical underpinnings of the science in class and in laboratory work, associated with most courses. This broad foundation gives students the power to maintain their skills and functionality in the rapidly changing world of technology.

The CS program at BYU is accredited by ABET's Computer Accreditation Commission.

The Industry

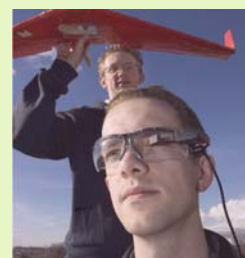


Upon successful completion of the Computer Science program at BYU, students are actively recruited by major computer corporations, commercial software companies, research institutions, and by players in the general industry. In addition, graduates are sought after by employers in other fields, such as graphics and animation, business, health, and banking. Students receiving degrees from BYU's Computer Science Department are confident programmers and problem solvers, prepared for entrance into established and emerging CS fields as well as other areas where technology and computers play increasingly significant roles.

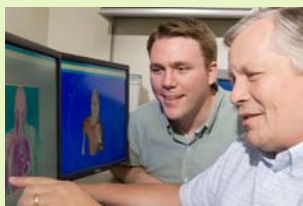
www.cs.byu.edu

The Degrees

The CS Department offers three demanding, yet rewarding, undergraduate degrees, each delivering core computer science fundamentals. Students pursuing the original **Computer Science Major** study fundamentals in discrete mathematics, data structures, theory of computation, computer architecture, operating systems, algorithm analysis, and software design, before choosing elective courses which allow them to create an academic experience tailored to their individual interests. The elective courses explore computer graphics, interface software, networks, security, artificial intelligence, machine learning, verification/validation, distributed systems, software design, signal image processing, models, and optimization. Students wishing to pursue careers at animation and game programming studios may wish to consider a BS in Computer Science with an **Animation Emphasis**. In the Animation Emphasis, students learn both the technical and artistic side of creating and implementing digital animations and games. Finally, students who want to build software to assist in analyzing biological systems are offered a BS in Computer Science with a **Bioinformatics Emphasis**. Bioinformatics students graduate with backgrounds in biology coupled with the software development and analytical skills necessary to implement large bioinformatics applications.



The Opportunities



Resources and Researching The program is noted for its undergraduate research opportunities. A strong emphasis is placed on professor-student mentoring, creating opportunities that are unique among most programs in the nation. Undergraduates are given the opportunity to work in one of the department's 17 research labs with faculty mentors and graduate students. In addition, students benefit from resources such as 14 open labs with nearly 360 work stations, MSDN software, web space, computer support, advisement, and student organizations.

Careers and Employment Students can post résumés and find part- and full-time job opportunities on the department résumé database and job board, located at <http://cs.byu.edu>. The website also offers information about great internships across the country at <http://cs.byu.edu/internships>. To prepare for future careers, students are invited to attend career preparation seminars and career fairs held each semester. In addition, students can seek career advice from the college advisement center, the department undergraduate assistant, and Jay Irvine, the college career advisor.

Where to go for more information

College Advisement Center:	Shane Jorgenson, director—(801) 422-6270, shanej@byu.edu , N-179 ESC Darlene Willey, (801) 422-6270, darlene.willey@byu.edu , N-179 ESC
CS Undergraduate Program:	Kiersten Nielsen, undergraduate assistant—(801) 422-9439, kiersten@cs.byu.edu Paul Roper, undergraduate advisor—(801) 422-8149, proper@cs.byu.edu
CS Career Placement Services:	Jay Irvine, coordinator—(801) 422-7656, jay_irvine@byu.edu
General Department Info:	3361 TMCB, (801) 422-3027, ofcsec@cs.byu.edu , https://www.cs.byu.edu

Frequently Asked Questions

1. Which Computer- Oriented Degree program is for me?

Computer Science—(72-84 hours)—students study the theory, design and development of software. The original Computer Science major and the Computer Engineering major share 29 hours of common core classes (11 hours math, 3 hours physics, 3 hours computer hardware, and 12 hours programming). This allows students interested in computers some time to explore both programs before deciding on a major. Computer science students receive a basic introduction to computer hardware (3 credit hours). The majority of the coursework (about 50 credit hours) concentrates on the theory and design of algorithms and algorithmic processes for a variety of software applications such as operating systems, artificial intelligence, graphics, compilers, databases, and networking. Students learn how to model, develop and program computer applications to solve significant problems. The department also offers a bioinformatics emphasis, designed for students who are interested in building software to assist in analyzing biological systems, and an animation emphasis, ideal for students wishing to pursue careers in animation and video game development studios. Computer science majors are in high demand and are best prepared for software design and development jobs.

Computer Engineering—(92-93 hours)—a cross between Computer Science and Electrical Engineering. Computer engineering students receive training in the fundamentals of software design and development from the computer science department (12 credit hours) as well as a basis in electronics and communications from electrical engineering (15 credit hours). Finally, they receive in depth training in the design of computer logic and circuitry (18 hours). Computer engineering students are in high demand and go into a variety of computer design and development jobs. <http://www.ee.byu.edu/>

Information Technology—(76.5 hours)—focuses on the application of computer technology to solve problems. Students develop and design primarily at the system rather than the component level. Electronics Information Technology students receive a basic coverage of electronics (6 – 8 hours). Students receive the same science background (8 hours calculus, 6 hours physics, 3 hours statistics) as computer science students as well as a good basic introduction to computers and computer programming (13 hours). The balance of the program (26 hours) concentrates on computer applications such as communications, networking, operating systems and databases with an emphasis on laboratory and project experience. <http://it.et.byu.edu/>

Information Systems—(74-75 hours)—teaches students to understand the effective and efficient use of information and communication technologies within a business setting. This major involves two broad areas: the acquisition, deployment, and management of an organization's IS resources and services, and the development of computer-based systems and technology infrastructures for use in organization processes. The courses include programming (3 hours), database design (3 hours), systems analysis and design (6 hours), and data communications and enterprise applications (6 hours). Admission by application. <http://marriottschool.byu.edu/bsis/>

2. Do any of the CS requirements also fill General Education Requirements?

- Physics 121 is a CS requirement which partially fills the Physical Science University Core requirement. The remainder of the Physical Science University Core requirement can be filled by taking an additional approved chemistry or geology course. Please see MyMap—<http://mymap.byu.edu>—for more information.
- Physics 220 fulfills a CS elective. However, Physics 220 may NOT be used to fulfill any other University Core or departmental requirements if used to fulfill this elective.
- Math 112, Math 113, and Statistics 221 are CS requirements which fill the Advanced Languages/Quantitative Reasoning GE requirement.
- English 316 is a CS requirement which fills the Advanced Writing GE requirement.

3. I have taken a course at another school that I think is equivalent to a CS required course. How can I get credit for it and how much credit can be transferred?

Determine which classes you think should transfer by looking at the web pages for the classes at <http://www.cs.byu.edu/courses/>. Take your proposed list of transfer classes to the College Advisement center. If your classes are from a school that we do not have an articulation agreement with, you will need to meet with the CS Undergraduate Advisor. Please be sure to bring your proposed list of transfer classes, your ABC report and your transcripts with you to the meeting. Normally only 12 credit hours transfer.

4. Is there a CS minor offered?

Yes. Information about the CS Minor is available at http://cs.byu.edu/undergraduate/cs_minor.

5. Can I get a CS Teaching Minor if I am not an Education Major? No.

6. Can I get credit for my internship or work experience?

Although work experience, particularly high quality internships, is extremely valuable to students and is strongly encouraged by the department, no credit is offered. International students interested in taking CS 199R as an internship experience should speak to Dr. Dennis Ng (422-2835, ng@cs.byu.edu, 3322 TMCB).

7. Can I study video game programming or something related to video games at BYU?

Many of our students become computer game programmers. Interested students should enroll in the CS Animation Emphasis or study as Computer Science Majors and specialize in graphics during their senior years.

8. I've heard that the job market is really poor for CS majors. What do you think?

The job market for CS majors is thriving. CS is one of the fastest growing fields in the nation, offering some of the highest salaries for new graduates. Students who have completed CS 240 should be able to get good summer programming jobs that will give them experience and help pay for college and living expenses.

9. Are there any classes that I should avoid taking together?

Students should follow the prerequisite chart found at <http://cs.byu.edu/undergraduate> when selecting course order. Some courses are more challenging than others, and require a greater allotment of time during the semester when they are taken. CS 240, 345 and 360 are particularly time consuming. Students should avoid taking more than 2 other CS courses during the semesters in which these courses are taken, and under no circumstance should they be taken together.

10. I want to take a challenge exam for a CS course, how do I do it?

With the exception of CS 142, which a small number of students challenge, there are no standard challenge exams for CS courses. Students should contact the professor who is teaching the course and work with him/her to create a challenge process. The nature of Computer Science makes it difficult to create typical exams, so professors may ask for a significant amount of written code as part of the challenge process. Most professors do not allow any challenge exams for their courses. For information on challenging CS 142, please see the course website at <http://www.cs.byu.edu/courses/index.php?id=44> or speak to the undergraduate secretary.

11. How do I waive a course?

Students should contact the undergraduate advisor to waive a course. This rarely occurs for any class other than CS 142, which is routinely waived for students with significant programming experience or credit for the AP Computer Science exam.

12. What should I do if I need to take a class without taking the prerequisites?

Talk to the professor who will be teaching the course to find out on what the class actually depends. If the professor agrees to let you into the class, you may have to do some extra work to fulfill those dependencies. The exception to this rule is for the 300- and 400-level CS courses that depend on CS 240. Students are not allowed to register for 300- or 400-level courses until they have passed CS 240 with a C- or above.

13. If I fill out a graduation plan, am I committed to following it?

No, the graduation plan allows you to spot semesters when there may be conflicts with your courses and provides an opportunity for you to see when you might graduate. There is no problem if you decide to change things in the future. Students should consult the 5 year projected offerings page at <http://cs.byu.edu/courses/index.php?section=fiveyear> as they are making plans.



Careers in Computer Science

Invest in a bright future!

According to the Bureau of Labor Statistics, the future of the IT job market looks bright. Five of the top ten fastest growing jobs between now and 2014—across any industry—are tech jobs.

Fact:

Computer science and computer engineering jobs are some of the fastest growing occupations in the nation.

Fact:

Computer science majors make some of the country's highest starting salaries for college grads, averaging \$50,000 a year.

Fact:

Universities across the nation are experiencing enrollment declines while employers are saying they can't find enough candidates.

Fact:

For every technological job outsourced from the U.S, nine new jobs in the technological field are created in the U.S.

Fact:

In the U.S. alone, at least 1.5 million additional IT field professionals will be needed by the end of this year. Those trends will continue.

Sources: U.S. Bureau of Labor Statistics, <www.bls.gov>.

"Why are students leaving computer science?" Gannet News Service. *Salt Lake Tribune*. Friday, October 13, 2006.

McGuire, James. "Top five fastest growing IT jobs," *IT Management*, September 15, 2006. <<http://itmanagement.earthweb.com/career/article.php>>

Harris, McLaren. "Power Architecture directions: Two-year-old Academic Initiative enhances computer science curricula, seeks to reverse student decline; An interview with Gina Poole, IBM Vice President of Innovation and University Relations." *developerWorks.com*, April 11, 2006.

Question: What can I do with a degree in Computer Science?

Answer: Just about anything you want! Computer science is one of the fastest growing fields in the nation!



The five fastest growing tech jobs are...

1. Networks systems and data communications analyst

- Expected growth rate: 54.6%
- Median annual salary: \$60,600.
- The number of computer networks – and the interlocking relationship between these networks – continues to grow rapidly. Network systems and data communications analysts design, evaluate, test and maintain a diverse array of networks. Conceiving of these networks is complex and highly-skilled work, as a network might connect offices across continents or offices right down the hall. According to government statistics, this is the fastest growing position across any field—tech or otherwise.



2. Computer applications software engineer

- Expected growth rate: 48.4%
- Median annual salary: \$74,980
- Firms of all sizes will require the services of developers who can write and customize software in response to constantly changing consumer and industrial needs. Engineers develop applications for personal computers, servers, and computer networks. The work is detail oriented yet conceptual and creative.

3. Computer systems software engineer

- Expected growth rate: 43%
- Median annual salary: \$79,740
- Today's computer systems are growing obsolete by the minute, resulting in a growing demand for experts to conceive of, build, and maintain networks and data centers. Systems engineers build companies' computer systems and/or data centers and must understand the overall needs of the enterprise. The systems often encompass all or part of an enterprise's inventory, employee communication, billing, and data storage requirements. Systems engineers must build these systems as cost effectively as possible, creating a secure system that allows for future updates.



4. Network/computer systems administrator

- Expected growth rate : 38.4%
- Median annual salary: \$58,190
- In many tech job banks, "Windows network administrator" is the job title with the most openings. Enterprises rely upon the network administrator. Without a skilled and ever-vigilant administrator, it all ceases to function.

5. Database administrator

- Expected growth rate: 38.2%
- Median annual salary: \$60,650
- As archived information keeps doubling and tripling, the need for database administrators to organize and maintain these storage systems will increase as well. Database administrators maintain storage systems, running archival networks with an eye toward maximizing user efficiency. Going forward, security is becoming an increasingly important aspect of the job.

