



Computer Science

It is difficult, maybe even impossible, to imagine contemporary civilization without computing machines and the software that brings them to life. From science to medicine, engineering to commerce, and music to reading—digital devices are everywhere. Computer science majors are also everywhere—designing software for business and industry, implementing the next generation of video games, using computation to unravel the mysteries of genes and human intelligence, and building increasingly sophisticated computers and other digital devices. At Gonzaga, computer science students gain the skills to innovate with these technologies, while also expanding their capacities for critical thinking and ethical reflection in the Jesuit tradition.

THE PROGRAM

The School of Engineering and Applied Science offers a **Bachelor of Science (B.S.) in Computer Science**. Computer science is the study of computing in all of its forms. It has led to the development of the software that runs on our computers. Software makes much of a computer's everyday functionality possible. Web browsing, downloading music and videos, and even the very existence of digital music and videos are all made possible by software.

The Computer Science major at Gonzaga is built on a foundation of courses in science, mathematics, intensive programming, software development and engineering, and computer architecture. The program offers a broad range of advanced computer science topics, including:

- artificial intelligence
- computer graphics
- computer networks
- database management systems
- cryptography
- computer security
- mobile programming
- speech and natural language processing

All seniors participate in either a large software engineering or group research project, completed under the guidance of a faculty member and a project sponsor. Gonzaga University also offers an 18-credit minor in Computer Science. Students who are considering a business, science or humanities career will benefit from this option. The minor consists of three required courses (Computer Science I, Computer Science II, and Data Structures) and nine credits of computer science electives. Students may use the nine credits of electives to focus on an area of particular interest, including artificial intelligence, database management, web design, and computer graphics.

The **B.A. in Computer Science and Computational Thinking** is built upon a foundation of computer science and the liberal arts. The curriculum provides all majors with a foundation in Computer Science through 21 credits in Mathematics and Computer Science courses. Students interested in the B.A. in Computer Science and Computational Thinking may consider several options, selecting a Discipline for Computational Thinking (DCT), or track, consisting of at least 12 credits in one other discipline in the College of Arts and Sciences. In consultation with their advisor, students also choose an additional 21 credits in Computer Science courses, including Computer Science courses specific to each track. Each student's track will be overseen by a DCT Committee consisting of the Program Director, the Chair of the Computer Science Department, and the Chair (or Chair's designate) of the department selected by the student as the DCT. Students are encouraged to complete the courses in the DCT and the Computer Science courses specific to that DCT before the senior year. All seniors participate in a large software engineering project, completed under the guidance of a faculty member and a project sponsor.

THE EQUIPMENT

The Department of Computer Science operates the following labs:

- The Intel Corporation Computational Science Laboratory consists of a computing cluster that provides the computational presence for both faculty and undergraduate students to use in classes and for research.
- The Computer Science Research Lab is available for faculty research projects in sensors, NLP, and data management.
- The General Computing Lab contains 32 machines running both virtual Linux and Windows.
- The Senior Lab has 24 networked computers running a mix of Windows, Linux, and Mac OS, which is used for senior software engineering projects.

RESEARCH OPPORTUNITIES

Promising undergraduates have the opportunity to assist faculty in their research. Faculty research interests include remote sensor networks, wireless mobile networks, robotics, genetic algorithms, speech recognition, mathematical modeling, scientific data management, database systems, cloud computing, and computer security. The Department of Computer Science is also a joint participant, along with Mathematics and Civil Engineering, in the **Gonzaga University Center for Evolutionary Algorithms (GUCEA)**. GUCEA has presented student-assisted research at international conferences in Europe and the United States. Select students can participate in these and other projects through GUCEA, the Intel Corporation Computational Sciences Laboratory, the Sensor Networks and Robotics Laboratory, or directly with a faculty mentor. To read more about specific research opportunities at Gonzaga, please visit gonzaga.edu/computer-science.

OUTCOMES

Graduates of computer science programs typically work as software engineers, computer scientists, and computational scientists, though many go on to careers in business and law as well.

Software engineers are responsible for the design, development, and maintenance of the software that makes computing possible.

Software engineers designed the operating system on your computer, the applications on your cell phone, and the air traffic control systems that make air travel possible. A major in Computer Science at Gonzaga can lead you immediately into a software engineering career.

An increasing fraction of our students go on to fully-funded doctoral work in computer science. When finished with their studies, they work as computer scientists in academic, government, and industrial research labs. Computer

scientists are responsible for the theoretical breakthroughs that make modern computing possible. In recent years, computer scientists have developed new techniques for speech recognition programs, machine learning, networks of sensor devices, cryptographic algorithms, and programming languages, among many others.

Computational scientists bring the richness of computational power to the complex problems that arise in science, engineering, and the social sciences. One of the most spectacular examples is the decoding of the human genome, an enterprise unthinkable without computers, software, and the computational scientists who harnessed them. Computational scientists usually have training both in computer science and in an application discipline like biology, chemistry, climate science, or physics.

Computer Science graduates from Gonzaga often go directly to the computer industry or to further study in business, law, another scientific discipline, or computer science itself. To prepare for these opportunities, many Gonzaga Computer Science students pursue summer research or internships. Many of our students secure summer research funding through the National Science Foundation-sponsored Research Experience for Undergraduates program. Others intern in the computer industry, some with companies that regularly work with our department.

Our graduates frequently begin their careers in software engineering at some of the best-known firms in computing like Amazon, Boeing, Microsoft, and Google. Those going on to graduate programs in computer science usually receive a full stipend that covers their graduate tuition, fees, and some living expenses.

THE PEOPLE

The Computer Science faculty are committed both to teaching and advancing the state of the discipline. All faculty

members teach a full range of courses, from freshman to senior level. All maintain posted office hours, advising sessions, and a commitment to student success. Several of the faculty have years of industry experience with noteworthy computing firms. Several others have research programs in speech recognition, genetic algorithms, database management systems, computer networks, and computer modeling that employ students as research assistants.

FACULTY CONTACT AND SPECIALTIES

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