



Engineering & Applied Science

Engineers and computer scientists apply knowledge of mathematics, logic, and the natural sciences to develop products and solutions to meet human needs. They are creative problem-solvers. Commercial rockets, skyscrapers, smart phones and their apps, Indy racing cars, satellite communication systems, and consumer goods are all created and designed by skilled and visionary engineers and computer scientists. Students interested in these disciplines are often inquisitive individuals who are interested in understanding how things work and who have a desire to develop solutions that address needs. Demonstrating a strong aptitude in math and science, excellent communication skills, and a commitment to the highest ethical standards are important qualities in future students. Gonzaga University engineering and computer science students go beyond the basic theory to application of their disciplines with concern for society and the environment.

THE PROGRAM

The School of Engineering and Applied Science (SEAS) at Gonzaga University offers four-year Bachelor of Science degrees in Civil Engineering, Computer Engineering, Computer Science, Electrical Engineering, Engineering Management, and Mechanical Engineering.

Civil engineers help optimize the design and use of both built and natural environments. A civil engineer plans, designs, and supervises the creation of the infrastructure and environmental solutions required by society.

Examples of civil engineering projects include structural applications such as bridges, highways, and skyscrapers, as well as environmental/water resource applications such as water supply, flood control, waste management, and environmental restoration. Civil engineers have roles in design, management, regulatory enforcement, and policy development.

Computer engineers are responsible for the design of computer technologies ranging from laptop/desktop/tablet computing platforms, to technologies embedded in devices such as cell phones, appliances, aircraft, and medical equipment. They are also at the cutting edge of “super” computing technologies, including consideration of energy efficiency in computing design and use of new materials to enhance the capacities of computer resources. A computer engineer must understand circuitry and micro-electronics, software design, design of the physical hardware, and finally, how to use an operating system to make hardware and software function in sync. As a result, a computer engineering student receives foundational courses required in both electrical engineering and computer science.

Computer scientists study computing in all of its forms and across all of its platforms. The impact of computer scientists can be found in PCs, tablets, iPads, and also in both high-end and consumer technologies ranging from cell phones to autonomous vehicles. Based on coursework in mathematics, programming languages, design of algorithms, architecture, and theory of computation, graduates of our computer science program commonly go on to graduate studies or enter careers as software engineers, computer scientists, or computational scientists. In addition, many also go on to careers in business and law. The Computer Science major at Gonzaga offers a broad range of advanced computer science topics, such as artificial intelligence, computer graphics, robotics, computer networks, database management systems, cryptography, computer security, and computational linguistics.

Electrical engineers study application of electronics and circuitry to such diverse applications as electrical power production and distribution, use of electronic circuitry to provide automated control, telecommunications, electro-optics, information theory, and image processing. Every time people make phone calls, turn on a light or the TV, or type on a computer, they are using inventions created by electrical engineers. Electrical engineering graduates find employment in many different industries including power utilities, telecommunications, computers, commercial electronics, aerospace, defense, education, government, medicine, and law.

Engineering Management is a program designed to provide students with a broad education and understanding of the practice and concepts of engineering, as well as principles from the business disciplines. Engineering Management is especially well suited for Gonzaga students interested in obtaining a combination of engineering, business, and management skills. The program contains a set of engineering core courses that provide a solid basis in engineering principles. These courses are augmented with relevant courses in business and management as they apply to technically-based projects. Students also develop a technical concentration by taking a set of courses focused in one of five tracks—Civil, Computer, Electrical, or Mechanical Engineering, or Computer Science. This program is offered in conjunction with the School of Business Administration and provides students with the opportunity to stay for a fifth year to complete an accelerated Master's in Business Administration (M.B.A.) degree.

Mechanical engineers pursue mechanical and related engineering knowledge applicable to a broad range of activities varying from biomedical research to the design of rocket engines. Mechanical engineers apply the principles of the physical sciences to the production and use of specialized materials, production of energy, the design of machines, and the creation of equipment and systems for manufacturing. Gonzaga's program emphasizes the thermal sciences and their application to the design and analysis of energy-producing systems. The program makes extensive use of computer-aided design (CAD), computer-aided engineering (CAE), and other computer-based applications.

SENIOR DESIGN PROJECTS

Gonzaga University's Center for Engineering Design & Entrepreneurship (CEDE) organizes, supports, and advises students undertaking senior capstone projects, commonly defined either by external partners or through the efforts of our students and faculty. CEDE projects challenge students to solve real world problems subject to real world constraints. Most project teams consist of three to five students, a faculty advisor, and a liaison engineer or computer scientist from the sponsoring company or organization. All projects culminate in formal presentation of results during the annual Design Exposition Day.

Recent sponsors include Avista, Boeing, the City of Spokane, Coffman Engineers, Eclipse Engineering, Eigen Wireless, FLSmith, Galaxy Compounds, Gray and Osborne, Integrus Architecture, Grand Coulee Dam, Haakon Industries, HDR Engineering, Hotstart Inc., HP Inc., Indiana DNR, Kaiser Aluminum – Trentwood Works, KEEN, KRN Services, MSAADA Architects, NIOSH, SCAFCO, Schweitzer Engineering Laboratories, Skils'Kin, Spokane County, the Spokane Tribe of Indians, Thr3, Inc., Tate Technologies, UTC Aerospace Systems, the US EPA, and the Washington State Departments of Ecology and Transportation.

HIGH SCHOOL PREPARATION

High school students interested in studying engineering or computer science need to prepare themselves by taking four years of math. Completion of a first course in calculus prior to enrollment at Gonzaga is strongly recommended. In addition, students should take at least three years of science, including physics. Transfer students from two-year or four-year colleges should consult with Audrey Minton (minton@gonzaga.edu) of the Office of Admission regarding transfer credits.

ENGINEERING AND COMPUTER SCIENCE AT GONZAGA

In the Jesuit tradition, Gonzaga University focuses on all dimensions of a student's development. In addition to a technical curriculum, our students complete courses in philosophy, religious studies, history and literature. These courses develop strong communication skills in speaking and writing, while also developing skills in critical thinking and ethical reasoning.

In particular, the School focuses on promoting character formation, particularly honesty, tenacity, courage, and citizenship. Students are encouraged to reflect upon the role of that formation throughout their professional experience. These attributes work together with the Jesuit educational values of ethics, leadership, faith, service, and justice.

Gonzaga's degree programs in Civil, Computer, Electrical and Mechanical Engineering are accredited through the Engineering Accreditation Commission of ABET (EAC/ABET). Computer Science is accredited through the Computing Accreditation Commission of ABET (CAC/

ABET). Engineering Management is in the process of seeking initial accreditation (EAC/ABET).

DISTINCTIVE OPPORTUNITIES

Since 2010, SEAS sophomores have had the opportunity to study abroad in Florence, Italy during the Spring semester. Specific Gonzaga in Florence courses are designed to fit into civil and mechanical engineering students' existing curricula and requirements. Gonzaga is actively developing additional study abroad opportunities such as at the University of Auckland in New Zealand or individual study abroad options identified by individual students. Studying abroad gives students an opportunity to both experience and work within different international cultures.

True to the Jesuit mission of reaching out in compassion as men and women for and with others, SEAS students and faculty are committed to pursuing their disciplines with a purpose. SEAS students have traveled to the African nations of Benin, Zambia, and Tanzania to work on challenges involving water supply, waste minimization, safe cook stoves, and provision of computing equipment. They are also very active in central and eastern Washington through work on fire-resistant housing, collaborative projects on regional tribal lands, tutoring to local K-12 students, and working in local sustainability gardens. Involvement in student organizations is an important part of academic life at GU for engineering and computer science students.



Formal and informal professional societies and club opportunities include chapters of the American Society of Civil Engineers (ASCE), the American Society of Mechanical Engineers (ASME), the American Society of Engineering Management (ASEM), and the Institute of Electrical and Electronic Engineers (IEEE).

Additional active groups on campus are the Society of Women Engineers (SWE), Material Advantage, the prestigious Tau Beta Pi national honor society, Gonzaga Without Borders, the Society of Automotive Engineers (SAE), the Association for Computing Machinery, and Upsilon Pi Epsilon (UPE), an international honor society for computing and information disciplines, Robotics Club, Women in Computing, and the GU RoboSub club.

OUTCOMES

A wide variety of career opportunities await graduating engineers and computer scientists, including employment with large corporations, consulting firms, state agencies, federal agencies, and overseas companies. Our students are also pursuing graduate studies in the technical disciplines, business, and law in increasing numbers. The starting salaries for engineers and computer scientists are among the highest offered to all college graduates. These technical degrees are also versatile. Our students often cross over into related fields such as the aerospace, biomedical, bioengineering and power engineering fields.

EMPLOYERS

- Amazon
- Apple
- Avista
- Boeing
- Coffman Engineers
- EMC
- Google
- HP, Inc.
- Intel
- Microsoft
- National Institute of Occupational Safety and Health
- Parker Hannifin Corp.
- Schweitzer Engineering Laboratories
- SpaceX
- United Technologies Aerospace Systems
- United States Military
- Xylem, Inc.

GRADUATE SCHOOLS

- Colorado School of Mines
- Duke University
- Purdue University
- Stanford University
- University of California, Los Angeles
- University of Colorado
- University of Florida
- University of Notre Dame
- University of Southern California
- University of Washington
- Washington State University



THE PLACE

Excellent engineering and computer science programs require up-to-date technology and tools. SEAS enjoys support from both the University and private industry and offers students advanced facilities and lab equipment with the latest technology. Gonzaga's engineering and computer science programs have their own lab facilities that provide opportunities for hands-on experiments and research in each field. Through the facilities at the Herak building and the Gold-level LEED-certified PACCAR building, Gonzaga students gain valuable learning experiences in a variety of applications including environmental protection, robotics, propulsion, computing, electronic circuitry, and machining. The CAD/CAE labs provide a fully-networked computer environment where both hardware and software are regularly updated to better support the needs of students and faculty.



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