

# Computer Science and Engineering



## Senior Design and Research

Undergraduate seniors undertake a comprehensive and intensive capstone project known as the senior design project. In-depth application of the skills learned during the preceding years, from initial concept development through analysis, design, and report writing, replicates the process demanded of engineers in practice. To name just a few recent projects, students have developed numerous video games, created a Dynamic MIDI Controller offering an entirely new way of composing music, and have worked on the control systems of a wide range of applications—from nanosatellites to a fully functional solar-powered home that took third place in the U.S. Department of Energy's Solar Decathlon competition. A highlight of the academic year, the Senior Design Conference affords students an opportunity to present their projects before a panel of alumni and other invited industry judges.

## Co-op and Internship Programs

Situated in the heart of Silicon Valley, the center for innovation and entrepreneurship, SCU offers computer science and engineering students unsurpassed opportunities for corporate internships and cooperative education. Working with an industry partner in a business setting provides an invaluable range of experiences, and allows students to put their academic prowess to work.

## Study Abroad

Studying in a foreign country provides an unmatched experience that engineering undergraduates can readily enjoy. Sample plans for freshmen and sophomores make it easy to prepare for this tremendous opportunity. Students can spend one or more terms abroad, complete their coursework, and graduate within four years.

## After Graduation

SCU's mix of practical and theoretical experiences and our commitment to academic and ethical excellence cultivates outstanding engineers who are highly sought-after candidates for higher education and employment. Our students are well prepared to enter graduate computer engineering programs at SCU or any school across the country. Employers in Silicon Valley and globally provide a wealth of opportunities for SCU computer science and engineering graduates in a variety of career paths.

## Faculty

**Maya Ackerman**, assistant professor, Ph.D., University of Waterloo. *Expertise:* machine learning, computational creativity, cluster analysis, algorithmic composition

**Ahmed Amer**, associate professor, Ph.D., UC Santa Cruz. *Expertise:* systems software, ethics, distributed systems, predictive management of data and storage, alternative and upcoming storage technologies, energy management

**Darren Atkinson**, associate professor, Ph.D., UC San Diego. *Expertise:* software engineering, compilers, static analysis tools, data structures, programming languages

**Ronald Danielson**, associate professor, Ph.D., University of Illinois at Urbana-Champaign. *Expertise:* impact of information technology on organizations

**Ruth Davis**, Lee and Seymour Graff Professor and associate dean for undergraduate studies, Ph.D., UC Santa Cruz. *Expertise:* formal methods in software engineering, programming languages, improving diversity in engineering

**Behnam Dezfouli**, assistant professor, Ph.D., Universiti Teknologi Malaysia. *Expertise:* internet of things, wireless networks, software-defined networking, performance evaluation of computer networks

**Yi Fang**, assistant professor, Ph.D., Purdue University. *Expertise:* Web science, data-intensive computing, large-scale information retrieval

**Silvia Figueira**, associate professor, Ph.D., UC San Diego. *Expertise:* computing for sustainable development, humanitarian engineering

**Daniel Lewis**, associate professor, Ph.D., Syracuse University. *Expertise:* embedded systems, K-12 outreach

**Xiang Li**, assistant professor, Ph.D., University of Florida. *Expertise:* social networks analysis, large-scale optimization and its intersection with cyber-security of networking systems, big data analysis, cyber physical systems

**Nam Ling**, chair, Sanfilippo Family Professor, IEEE Fellow, Ph.D., University of Louisiana at Lafayette. *Expertise:* video and image coding, architecture, video communications

**Ying Liu**, assistant professor, Ph.D., The State University of New York at Buffalo. *Expertise:* image and video analysis, computer vision, machine learning, high-dimensional data, compressed sensing

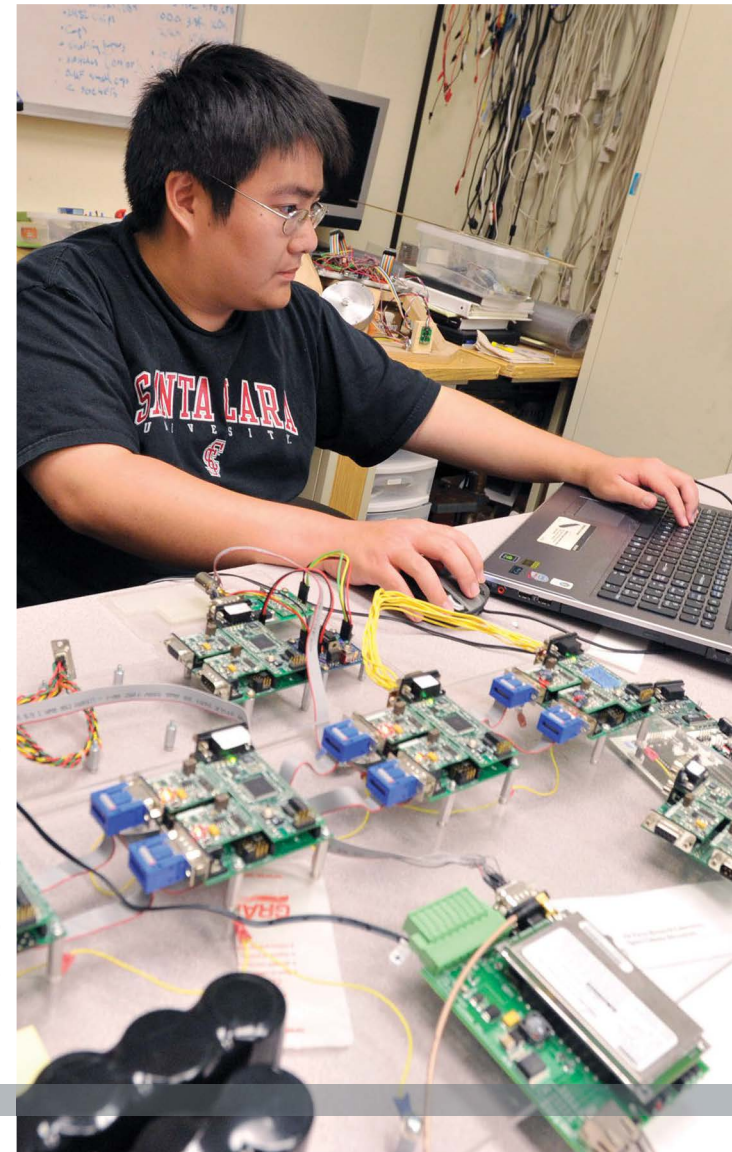
**Yuhong Liu**, assistant professor, Ph.D., University of Rhode Island. *Expertise:* trustworthy computing, cyber security issues in social networking, cloud computing and cyber physical systems

**Weijia Shang**, associate professor, Ph.D., Purdue University. *Expertise:* parallel processing, computer architecture, algorithm theory, nonlinear programming

## For further information, please contact

Department of Computer Science and Engineering  
Santa Clara University  
500 El Camino Real  
Santa Clara, CA 95053  
408-554-6805

[www.scu.edu/engineering/cse](http://www.scu.edu/engineering/cse)



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# Computer Science and Engineering



## Computer science and engineering focuses on the theoretical and practical aspects of computing.

Combining features of both computer science and computer engineering, this field of study concerns the design and construction of both software and hardware systems. The discipline spans areas such as networking and the World Wide Web, embedded programming, software engineering, digital hardware systems, information assurance, and robotics.

Our students design and implement software and hardware, devise new ways to use computers, and develop effective methods for solving the world's problems. Our program has a strong engineering flavor, emphasizing the design, implementation, testing, and utilization of software and systems to optimize performance, reliability, and cost.

Computer science and engineering graduates find fulfilling careers in a number of exciting fields. Robotics, computer security, and Web technologies are just a few of the avenues open to them.

## Our Program

Located in the Department of Computer Science and Engineering, this program offers a comprehensive education for bachelor's, master's, and Ph.D. students. Our outstanding faculty, emphasis on values-based education, and focus on collaborative learning create an excellent environment for academic and personal growth that prepares our graduates to meet the challenges of an increasingly complex, digital world.

Students work with engaged, passionate faculty members who are leaders in their fields. A solid theoretical foundation, hands-on laboratory experience, and a curriculum that challenges students to think and act ethically, help prepare our graduates to either continue with advanced study or enter the workforce, where they are ready to make real contributions to society.

In this program, students have access to all the tools they need to be successful, including uncommonly accessible mentors who truly enjoy teaching, small classes, state-of-the-art computer laboratory facilities, interdisciplinary projects in which graduate and undergraduate students collaborate, and research opportunities available to all, from first-year students to Ph.D. candidates.

Many students opt to participate in our combined B.S./M.S. program to earn both a bachelor's and a master's degree in as little as five years.

## Program Educational Objectives

The computer science and engineering department has a comprehensive set of educational objectives for bachelor's, master's, and Ph.D. degree graduates.

### Undergraduate objectives

- Our graduates will achieve success in their professional endeavors, equipped with the liberal education and technical expertise required for the creative practice or advanced study of computing; will be motivated to communicate and work effectively in diverse personal and professional settings; and will demonstrate an appreciation of lifelong learning through continued personal and professional development.
- Our graduates will understand their personal and professional ethical responsibilities, and will observe and promote the highest ethical standards.
- Our graduates, equipped with their knowledge of science and engineering, will engage in activities that contribute to the benefit of society.

## Curriculum

The computer science and engineering department takes to heart the University's mission to "educate the whole person." Our curriculum is design-oriented and laboratory-intensive, with an emphasis on hands-on experience and teamwork that is crucial to success in a competitive workplace. In addition to providing an outstanding engineering education, we also prepare students to communicate effectively and work in a global economy.

At SCU, the core curriculum and our department's educational enrichment experience complement our comprehensive computer science and engineering courses with studies providing the knowledge, habits of mind, and ethical reflection that prepare students for meaningful engagement with the world. Our program offers the flexibility for undergraduates to take 12 or more units, selected in consultation with their academic advisor, that are tailored to their own interests. Students wishing to round out their education by studying abroad, learning a foreign language, or taking graphic arts courses can easily do so through our program.

### Undergraduate and graduate courses in computer science and engineering

- artificial intelligence
- computer architecture
- computer forensics
- computer hardware
- computer networks
- databases
- embedded systems
- graphics
- operating systems
- programming languages
- software engineering
- Web programming

### M.S. specialization tracks

- architecture and systems
- computer networks
- data science
- information assurance
- internet of things
- multimedia processing
- software engineering

