



BS Computer Science: Computer Game Design

Common Questions and Answers

The Bachelor of Science in Computer Science: Computer Game Design is a new undergraduate degree program focused on the construction and design of interactive computer games. Reflecting both the growing cultural and economic importance of the computer gaming industry within California and the increasing complexity and specialization of computer gaming systems, the new program focuses on the technical, narrative, and artistic underpinnings of these games. The degree features a freshman year game design experience, two upper-division digital media electives, and an intensive senior-year game design studio where students work in teams to develop a substantial video game. This four year interdisciplinary degree program provides a rigorous education in computer science, in concert with a broad introduction to those aspects of art, music, narrative, digital media, and computer engineering most relevant to games. Campus general education requirements ensure that students are exposed to a wide range of topics in the humanities, social sciences, and the arts.

Students wishing to matriculate in this degree program should apply for admission to UC Santa Cruz and the degree program for studies commencing either Freshman year, or Junior year (for transfer students from California community colleges). For additional information on the degree program, contact the School of Engineering Undergraduate Advising Office, advising@soe.ucsc.edu, (831) 459-5840.

What is the goal of the degree program?

The goal of the BS in Computer Science: Computer Game Design is to provide a deep understanding of the technical aspects of computer game engineering, and a broad background in the artistic, narrative, and dramatic elements of game design.

What other game design curriculum offerings exist in the University of California system?

At present, UCSC has the *only* full game design major in the UC system.

The only other formal program in the UC system is at UC Irvine, which has a Studio Art degree specialization in Game Culture and Technology, equivalent to a minor. Most UC campuses have individual courses with game-related content, but no formal degree programs.

What offerings are there at other four year schools in the San Francisco Bay Area?

Limited. Stanford, San Jose State University, San Francisco State University, University of San Francisco, and UC Berkeley all have 1-2 courses with some game related content. None of these schools have a four-year game design curriculum.

What kinds of computer game degree programs exist in the United States?

Undergraduate computer game degree programs tend to fall into one of three categories:

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Art focused:

These programs emphasize the artistic and graphic design aspects of computer games, with only a small number of programming courses. Their goal is to train students to join the art track of a computer game company.

Evenly split between art and technology:

Programs have strong computer science foundations, but do not go into computer science topics with the same depth as technology focused programs. Instead, they offer a broader mix of courses on game design topics.

Technology focused:

Programs are strong computer science degrees, with additional courses adding depth in computer game design. These programs aim to train students for the technical track in computer game companies. As compared to the other kinds of programs, the technically focused programs provide greater depth in computer science topics.

What kind of game degree program is the UCSC program?

UCSC's degree program is technology focused, as it has a strong core of computer science, to which are added courses on game design and digital media. Students in the UCSC program receive a deep and theoretical foundation in computer science, as well as the opportunity to take many courses that stress aspects of computer systems, such as databases, operating systems, networking and distributed systems, security, etc. UCSC has deep course sequences in computer graphics (4 courses available) and artificial intelligence (2 courses available). Advanced undergraduate students occasionally take advantage of the rich selection of graduate level courses.

What lab facilities support the program?

In 2006, the School of Engineering will construct an instructional game development laboratory. This laboratory will contain 10 high-end computer game development workstations with high performance graphics cards, and large high-resolution screens. Two computer game playing stations will also be present, featuring each of the latest game consoles (Xbox 360, Playstation 3, Wii), large display, and recent games of design significance. The goal of the laboratory is to provide students with a dedicated space to work in teams to construct advanced computer games. If possible, console development kits will be acquired for this laboratory, such as an Xbox 360 development kit, or Wii development kit.

What kind of research is being performed on computer games at UC Santa Cruz?

In 2006 UC Santa Cruz hired Michael Mateas to join the Computer Science Department. Mateas' research focuses on the artificial intelligence aspects of computer games, specifically how to make non-player characters more interactive and expressive. This research holds the promise of improving the interactivity of stories within computer games, and of making the computer controlled characters much more interesting, and adaptive. As the benefits of improved graphics capabilities plateaus, improved AI will be the avenue for enhanced gameplay. Mateas' game *Façade* (free download at www.interactivestory.net) won the Grand Jury Prize at the Slamdance Independent Games Festival in 2006, and has been featured in the New York Times, Economist, and Newsweek.

Computer Science Professor Charlie McDowell and Hierarchical Systems Research Foundation's David Doshay have developed *SlugGo*, one of the world's top computer Go playing programs. Computer Science Professor Robert Levinson's research on adaptive pattern-oriented learning has allowed him to develop *Morph*, a chess playing system that learns to play respectable chess from its experience only. Film and Digital Media Assistant Professor Warren Sack is developing a language game called *Agonistics*, where gameplay involves posted arguments and counter-arguments on an email list. Ecology and Evolutionary Biology Professor Barry Sinervo's game *LizardLand* allows students to explore the interactions among different types of lizards, whose natural behaviors form a kind of rock-paper-scis-

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sors game. The ultra-dominant polygynous orange-throated males best the more monogamous mate guarding blues; the oranges are in turn bested by the sneaker strategy of yellow-throated males, and the sneaker strategy of yellows is in turn bested by the mate guarding strategy of blue-throated males.

A hallmark of a University of California education is that advanced undergraduate students have the opportunity to participate in research projects.

What opportunities exist for students to create games?

The highlight of the degree program is the year-long three course Game Design Studio sequence in the Junior and Senior years. Every student in the major takes this sequence. In it, students work in teams to create a substantial video game. This acts as the capstone experience for the degree, and allows students to integrate the knowledge they have acquired in their prior coursework, as well as to engage in project-based learning.

Our hope is that students will use some of the artificial intelligence techniques developed by faculty member Michael Mateas to include rich computer-controlled characters in their games. In turn, this will make UCSC student games distinctively different from other student game projects in the US.

In addition to the Junior/Senior year studio sequence, the Game Design Experience course allows students to work in teams to develop games in their Freshman or Sophomore years. This course is only a quarter long, and provides students with an early introduction to issues of game design.

Additionally, many courses in the degree program have class projects with a computer gaming focus.

What kinds of career opportunities are there for graduates?

Graduates will be well positioned to secure jobs within the computer games industry, as well as general software engineering jobs within a broad array of information technology companies. Students in the program will receive a solid and broad background in computer science, and hence are also well positioned to continue on to graduate studies in computer science, digital media, or computer games. Since the degree explicitly has the name "Computer Science" in its title, students who decide to pursue traditional software engineering jobs after completing their degree will be at no disadvantage compared to those completing traditional computer science degree programs. In fact, we anticipate that completing a major capstone project may well be viewed as a significant plus factor when seeking jobs or postgraduate study.

In the Fall 2005 Career Guide published by Game Developer Magazine (the 4th iteration of this guide), the average nationwide salary for game developers with less than three years experience is \$54,300, with salaries in the San Francisco Bay Area generally being higher than the average. Additionally, average additional compensation (bonus, profit sharing, stock options) was \$21,872 for all game developers. There is a large and growing computer gaming industry nationwide, with many companies concentrated in California, offering strong wages. Especially with the transition to next-generation game consoles (Xbox 360, Playstation 3, Wii), demand for game programmers is rising. Many UCSC graduates are currently employed in the computer games industry.

Can students from California Community Colleges enter this program?

Yes. The program has been designed so that a student entering in their Junior year after spending their first two years in a Community College can still realistically graduate in two years. Students interested in starting first at a Community College might consider Foothill College, which is developing a computer gaming program.

What high school preparation is ideal for this degree program?

In addition to satisfying the normal UC admission requirements, we recommend that students have some background in computer programming in an object-oriented language (C++, Java, C#). Some game design experience is a plus, but not required. While a background in computer programming is a plus, note that students with no

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programming experience can still successfully complete the degree program, and there are designed pathways specifically for such students.

What kind of library facilities support the degree program?

Students need to have access to examples of excellent game design in order to develop their critical skills as game designers. Just as English Literature students read and critically analyze novels and other texts, Computer Game Design students play and critically analyze computer games. The Science and Engineering Library at UCSC is developing a collection of video games and game consoles to support the needs of students taking game design courses. Students will be able to check out a console, such as the original Nintendo Entertainment System (NES), and the top five games created for this console (Legend of Zelda, Super Mario Bros., etc.) Additionally, the library is developing a computer game room, where students can play games in the library on a variety of critically significant game consoles. This room is carefully isolated from the rest of the library, so students analyzing games will not disturb other students performing quiet study.

This is the first example of a campus library developing a collection of critically important video games, and making them generally available for study. We know of no other library in the UC system or elsewhere that will check out consoles and games to students. This is an exciting and distinctive quality of the UCSC program.

Is this a frivolous degree program, a kind of “zapping for credits?”

No. This is a rigorous, technically focused degree program requiring students to complete demanding courses in math and computer science. Students with poor time management skills who focus on playing games to the exclusion of their coursework will do poorly in the degree program. Playing and critically analyzing computer games is an important, but by no means exclusive activity for an aspiring game designer. UC Santa Cruz is seeking serious students with a passion for computer game design who wish to create innovative, leading edge games.

Does UC Santa Cruz have a minor in game design?

No. While this is a good idea, there are no current efforts underway to create a computer game design minor.

Does UC Santa Cruz offer a graduate degree in game design?

UCSC does not have a focused graduate degree program on computer game design. Students interested in advanced study in computer game design may want to pursue a MS or PhD in Computer Science, and target their research project on aspects of game design. Additionally, students might want to consider the Digital Arts New Media (DANM) program, where students create digital arts projects as part of their MFA degree requirements. These art projects can draw heavily upon computer game traditions.

Is the game degree accredited?

No, though UCSC does plan to have the degree program formally accredited over the coming 3-4 years. Since computer game design degrees are relatively new, accreditation requirements for such degree programs are emerging. UCSC will be acting in a leadership role here, as our accreditation activities will help clarify the requirements for other programs. UCSC expects to be among the first game degree programs in the US to have formal accreditation.

Who can I contact for more information about the degree program?

The School of Engineering Undergraduate Advising Office, <http://www.soe.ucsc.edu/advising/undergraduate/>, advising@soe.ucsc.edu, (831) 459-5840, can answer questions about the degree program, including detailed degree requirements. A four-page flyer provides a detailed description of the degree program's curriculum:

<http://www.cs.ucsc.edu/~ejw/gamedesign/game-design-details.pdf>

The fourth page provides a “program on a page” description of the curriculum.