

UtahState **UNIVERSITY**

MASTER OF SCIENCE

in

COMPUTER SCIENCE
(Distance Education Program)

Department of Computer Science
Utah State University
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Description

Through the Utah Education Network (UEN), the Computer Science Department of Utah State University offers coursework for both a Bachelor of Science (BS/CS degree), and a Master of Science (MS/CS degree) in computer science. This brochure describes the Master of Science program. A similar brochure is available describing the Bachelor of Science program. Courses are taught by regular computer science faculty and are delivered by IP video. At each receiving site, in addition to audio and video from USU, students are able ask questions through an audio uplink.

For registration information, costs, class times, and locations, interested students should contact their local USU Distance Education or Extension office.

The MS/CS degree is a graduate degree with emphases available in artificial intelligence; bioinformatics; parallel, distributed, and concurrent systems; and software systems. This degree is suited for students with or without an undergraduate degree in computer science. For those holding a BS/CS, this degree represents an opportunity for further study and research in the science of computing. For those without a BS/CS, while some background coursework may be required, the MS/CS is an excellent opportunity to gain the training and skills needed to launch a new career or upgrade in your current career.

The job opportunities for computer science graduates are excellent. Computer science is projected to be one of the major growth fields of the 21st century. While outsourcing is much talked about, the need for computer scientists far outpaces the supply. In many cases, this is the only reason for outsourcing. USU CS graduates are recruited nationwide by a variety of companies. Unlike nontechnical computer-related degrees, BS/CS graduates are qualified for work in all computer related fields, and thus, the demand for such graduates is great and will only increase in the future.

Program

This program is designed for students who hold a BS or BA in computer science, a related field, or a bachelor of science or arts with computing experience. Students may pursue a Plan A (Thesis Option), Plan B (Report Option), or Plan C (Coursework Option) through the satellite-based master's program. For a more detailed discussion of the requirements for each emphasis, see the section entitled [Course Requirements](#) below. Plan A (thesis) and Plan B (report) students not needing to complete background or preparatory courses can complete the coursework for this degree in as little as four or five semesters. The completion of a thesis or report typically requires another one to two semesters. Plan C students (coursework only) can complete a degree in as little as six semesters.

Program Specialties

Students in the graduate program take courses in a broad spectrum of topics. As part of their degree, Plan A and Plan B students complete a graduate thesis or report in an area of specialization. The areas of specialization are:

Artificial Intelligence

- Computer vision and image processing
- Evolutionary computation
- Neural networks
- Robotics
- Software agents
- Speech and language processing

Bioinformatics

- Sequence analysis
- Visualization
- Micro-arrays
- Evolutionary computation

Distributed, Parallel, and Concurrent Computing

- Autonomous negotiating teams
- Fault-tolerant systems
- High performance computing models
- Nano-concurrency
- Parallel applications

Software Systems

- Development and management processes
- Distributed systems design
- Graphics and visualization
- Object-oriented software development
- Computer and network security
- Software quality assurance
- User interfaces design

Admission Requirements

While there is some flexibility in the admission criteria, the general admission requirements are:

- experience in computing;
- programming background in two high-level languages as well as a working knowledge of calculus and statistics;
- background in algorithms and data structures; (This can be shown by coursework such as completion of the department's CS2420 or equivalent.);
- an undergraduate grade point average of at least 3.0;
- a general Graduate Record Exam (GRE) quantitative score of at least the 80th percentile;
- three positive letters of recommendation.

FAQ's Regarding Admission Requirements

The seven most frequently asked questions are:

Can the requirement to take the GRE be waived?

No. The GRE is a School of Graduate Studies requirement, and it cannot be waived. It also cannot be replaced by another exam such as the GMAT.

For how long do GRE scores remain valid?

There is an expiration date for the GRE. Contact the USU School of Graduate Studies (435-797-1189) to determine whether or not your scores are still valid.

Can I re-take the GRE to improve my score?

Yes.

If my quantitative score on the GRE is below the 80th percentile, do I have a chance for admission to the program?

To some extent, this depends on how far below this value your score is, and the quality of the other information you supply, e.g., prior Computer Science coursework grades, how positive the letters of recommendation are, etc.

In addition to the General GRE, do I need to take the GRE Computer Science subject exam?

The short answer is no. However, in a couple of circumstances, it can be useful. As noted under background/placement requirements, passing the GRE/CS subject exam at the 50th percentile or above automatically meets all placement requirements. Also, if a student is denied admission to the program because of insufficient computer science background, taking the GRE/CS subject exam and receiving a score at the 50th percentile or above is a means to show adequate background.

How do I get more information about the program?

You can contact Steve Allan steve.allan@usu.edu

Whom do I contact at my extension site to get information about classes, locations, etc.?

There are many locations throughout the State at which the courses are televised. See USU's Distance Education website for the location of the site closest to you <http://distance.usu.edu/>

Background Computer Science Requirements

Graduate students in computer science are expected to show a depth of background in the core undergraduate computer science curriculum and to complete their program of study in a timely manner. Depth of background in computer science may be shown in any one of – or a combination of – the following ways:

- Completion of the GRE Computer Science Subject Examination with a score above the 50th percentile.
- Pass the CS Department's Algorithms and Data Structures placement exam and two other placement exams selected from: computer architecture, operating systems, programming languages, automata, and software engineering.
- Complete, with a grade of B- or better in each, placement equivalent courses in Algorithms and Data Structures, and two from among Computer Architecture,

Operating Systems, Programming Languages, and Automata.

- Show completion of coursework from another college or university equivalent to the department placement courses with grades of B- or better in each. Equivalency of such courses is determined by the department. Such coursework must be done in the USA.

Placement Course Equivalencies

The following courses, if passed with a grade of B- or better, can be used to meet the associated placement requirement. In the Utah system, several of these courses have articulated equivalents at other schools. Please consult with the program administrator for equivalencies.

Algorithms & Data Structures – CS 2420 or CS 5050

Computer Architecture – CS 2810, CS 3810, ECE 5750, or ECE 5760

Operating Systems – CS 3100 or CS 5200

Automata – CS 5000

Programming Languages – CS 4700 or CS 5300

Use of Prior Coursework

Students often ask if they can use coursework taken while pursuing a graduate degree at another school or even in another department as part of the coursework for their MS/CS at USU. All coursework used for the graduate degree must be approved by the student's graduate committee. In cases where appropriate, coursework completed at another school may be used. A maximum of 12 such semester credits may be transferred. Courses taken P/F may not be transferred, and courses already used for a degree may not be transferred. Even though 12 credits can be transferred, there are three related credit requirements that may prevent the use of all 12 credits.

- No more than 15 credits of coursework below the 6000-level may be used for the MS.
- At least 4 6000-level or above USU computer science classes (12 credits) must be part of your graduate coursework.
- At least 24 credits must be completed in residence at USU.

USU courses taken at distance sites count as residence classes. Because of the 24 residence credits, Plan A and Plan B students cannot transfer in a full 12 credits taken at another school. For example, with a 30-credit Plan A program, only 6 credits could be transferred in.

Course Requirements

All Computer Science graduate students must complete four 6000-level and above USU computer science courses, i.e., courses numbered between 6000 and 7950 (except CS 6250), as well as one credit of CS 6900 (Computer Science Seminar). If CS 6950 is counted as one of these four classes, it must be taken as a 3 credit class. The sum of the credits of CS 5950 and CS 6950 that may be counted as part of the program of study is 3.

For their graduate program, students can choose Plan A, Plan B, or Plan C. For Plan A, the student must complete a total of 30 graduate semester credits, including exactly 6 credits of Thesis and Research (CS 6970). For Plan B, the student must complete a total of 34 graduate

semester credits, including exactly 2 hours of Thesis and Research (CS 6970). For Plan C, the student must complete a total of 37 graduate semester credits. No CS 6970 credits may be included in this total. Coursework must include both courses in at least one of the following sequences: CS 5050 & 6050; CS 5200 & 6200; CS 5300 & 6300; CS 5600 & 6600; CS 5650 & 6650; CS 5700 & 6700; CS 5800 & 7670; CS 6100 & 7100; CS 5460 & 6460; two from CS 5/6370, 7350, 7380; two from CS 5500, 6500, 6550, 7550; two from 5650, 6630, 6650, 7650, 7680; two from 5660, 5670, 6670.

No more than two courses used to satisfy these requirements may have grades below B-, and none can have grades below C. At most, 15 semester credit hours in courses at the 5000-level may be counted as part of any MS program of study.

Graduate level courses taken outside the Department of Computer Science may be accepted if approved by the student's graduate committee and the Graduate Dean.

For additional information, see the CS Department's website www.cs.usu.edu, see USU's General Catalog <http://www.usu.edu/ats/generalcatalog/PDF/2006-2007/56CS.pdf>, or contact Dr. Steve Allan steve.allan@usu.edu the Computer Science Graduate Program Coordinator.

Topics Classes (CS 5980, CS 6980)

Some of the courses offered in the program are topics classes. These are normal graduate credit classes, but they are offered under the "topics" listing because they are leading edge classes. As long as the topics are different, students may use more than one topics class in their program.

Time to Complete the Program

There are sufficient classes offered to complete the coursework requirement (taking two 3 credit classes per semester) for a Plan A program, in four semesters. In truth, however, most students take longer than four semesters to complete their coursework. There is a maximum time for completion. The School of Graduate Studies allows up to six years to complete a master's degree. It is advisable for students to work closely with their major professors and the CS Department Graduate Coordinator in order to finish in a timely manner.

Taking Courses before Matriculation, i.e., before Acceptance into the Program

It is not required that a student be matriculated, i.e., accepted in the MS/CS program in order to register for graduate classes. A maximum of 12 semester credits earned as a non-matriculated student may be used in the graduate degree if approved by the student's graduate committee. The key is acceptance by the graduate committee. It is a given that 5000-level or above computer science courses offered by USU through the distance program are accepted. For other courses, it is best to at least consult the program coordinator before taking the course. Courses used as part of an undergraduate program, even if they are graduate level, cannot be counted as part of a student's program of study. Note that transfer credits are counted as part of these 12 credits.

In order to take classes as a non-matriculated student, students must have started the application process and be admissible. In addition, students must have a letter from either the CS department head or graduate coordinator indicating that they are to be admitted as non-matriculated students.

Faculty and Areas of Specialization

Stephen J. Allan PhD 1979, Iowa State University.

Coarse-grain parallelism, parallel programming languages, parallel programming, recognition of parallelism.

Vicki H. Allan PhD 1986, Colorado State University.

Fine-grain parallelism, recognition of parallelism, program optimization, analysis of algorithms, agents.

Scott R. Cannon PhD 1977, University of Utah.

Parallel processing, real-time systems, biomedical applications.

Heng-Da Cheng PhD 1985, Purdue University.

Image processing, pattern recognition, artificial intelligence, neural networks, VLSI algorithms.

Stephen W. Clyde PhD 1993, Brigham Young University

Software engineering, software quality, distributed systems, multi-media systems.

Donald H. Cooley PhD 1973, University of Utah.

Neural networks, evolutionary algorithms, computer vision, multimedia systems.

Curtis Dyreson PhD 1994, University of Arizona

Databases, temporary query languages, XML, data warehousing.

Robert F. Erbacher ScD 1998, University of Massachusetts-Lowell.

Security, visualization, graphics.

Nicholas S. Flann PhD 1991, Oregon State University.

Machine learning, artificial intelligence, bioinformatics.

Minghui Jiang PhD 2005, Montana State University.

Bioinformatics, computational biology, design and analysis of algorithms, computational geometry.

Vladimir Kulyukin PhD 1998, University of Chicago.

Robotics, assistive technology, artificial intelligence.

SeungJin Lim PhD 2001, Brigham Young University.

Data mining, semi-structured databases, bioinformatics.

Chad Mano PhD 2006, University of Notre Dame.

Computer security, networking.

Supratik Mukhopadhyay PhD 2001, Max Planck Institute for Computer Science.

Software engineering, mobile systems.

Xiaojun Qi PhD 2001, Louisiana State University.

Image processing, pattern recognition, data mining.

Daniel W. Watson PhD 1993, Purdue University.
Parallel processing, heterogeneous computing systems, inter-connections networks.

Changhui (Charles) Yan PhD 2005, Iowa State University.
Bioinformatics, data mining, machine learning, computational biology.

Course Offerings

Generally, courses for the coming year are scheduled in the spring of the preceding year. However, on occasion, the course offering schedule may be changed. Students are advised to check the scheduled offerings each semester. Fall and spring semester classes are offered one night per week for 2.5 hours each over a 16 week period. Summer semester classes are offered two nights per week for 3 hours each over 7 weeks. Graduate credit classes generally begin at 5:15 PM and at 8:00 PM on week nights (either Tuesday or Thursday). In addition to graduate credit classes, at some sites, undergraduate (placement) classes are also offered.

During any semester CS 6900, CS 6950, and CS 6970 are also offered. For complete course descriptions, see the USU catalog at www.usu.edu. For further information about USU Distance Education examine www.ext.usu.edu/distance/distance/index.html

Computer Science Department Graduate Course Listing

For a complete list of graduate level courses, consult a current USU General Catalog.

Contact Information

Department Head/Distance Ed Coordinator

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