Missouri University of Science and Technology

Department of Computer Science

Undergraduate Brochure

Data Structures
Programming
Software Engineering
Algorithms
Theory of Computer Science
Intro to Operating Systems
Programming Languages
Discrete Math for Comp Sci
500 W. 15th Street
Rolla, MO 65409-0350
(573) 341-4491

E-mail: csdept@mst.edu
Check the latest department information at:
http://cs.mst.edu/

The Undergraduate Program in Computer Science
is Accredited by the Accreditation Board for
Engineering and Technology (ABET)

For information purposes only
Consult the Missouri S&T undergraduate catalog for official information

Updated February 2013
Missouri University of Science and Technology (Missouri S&T). Since its beginning in 1870, Missouri University of Science and Engineering has been a leader in higher education and research. Missouri S&T is large enough to provide a wide range of academic and extracurricular opportunities but small enough to allow close interaction between students and faculty.

Missouri S&T has an enrollment of about 7,000 students, including 1,750 graduate students. Approximately 95% of these students major in science and engineering.

THE UNIVERSITY
Missouri University of Science and Technology is one of the four University of Missouri campuses -- with other campuses in Columbia, Kansas City, and St. Louis.

The University of Missouri has a long and proud history. It was established at Columbia in 1839, only 18 years after Missouri became a state. It is a land-grant university and is recognized as the first state university west of the Mississippi River. It is also a member of the American Association of Universities.

In 1870 the Missouri School of Mines and Metallurgy (MSM) was established in Rolla. On July 1, 1964, MSM became part of the UM system and was renamed as the University of Missouri-Rolla (UMR). On January 1, 2008 UMR was renamed as Missouri University of Science and Technology (Missouri S&T). Since then, Missouri S&T has maintained its traditional strengths in science and engineering.

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The bachelor’s degree programs (B.S., B.A.) along with the master of science (M.S.), doctor of philosophy (Ph.D.), doctor of engineering, and professional development degrees are offered.

The Missouri S&T campus encompasses about 284 acres and combines old and new architecture. Many new buildings have recently enhanced the campus. Missouri S&T is large enough to provide a wide range of academic and extracurricular opportunities but small enough to allow close interaction between students and faculty.

WILSON LIBRARY
Wilson Library serves as a gateway to an ever-expanding world of information. A growing collection of books, periodicals, audiovisual materials and computer-based resources supports research and learning and provides entertainment as well. Most electronic resources are available 24/7 from any computer on campus, at home or in the dormitories. Students find the library a pleasant place to study, a central meeting place for study groups and sometimes just a comfortable place to socialize and relax!

The Missouri S&T library houses more than 450,000 volumes and currently subscribes to over 850 periodical titles.

These print resources are supplemented by a variety of other materials, including electronic journals, CDs, and videos. The collection is augmented by the existence of a shared catalog that allows users to request items from other Missouri colleges and by an active inter-library loan department that is able to borrow or obtain copies of most materials needed by Missouri S&T students and faculty.

Many library resources are accessible over the Internet. The library web page provides access to the catalog and a number of databases, including IEEE and ACM Digital Libraries. Workshops on library resources are offered on a regular basis, and librarians are available by appointment for specialized assistance. For more information, people are encouraged to explore the library home page at http://library.mst.edu.

Missouri S&T Information Technology

Getting Started

Information Technology (IT) provides a variety of computing tools and resources to assist with academic and administrative work done at Missouri S&T.

Most faculty, staff and students use computers daily to help with tasks such as these: to register for classes, communicate with friends using e-mail, collaborate on group projects and research, publish web pages, write reports and find course schedules just to name a few.

Computer accounts are assigned to students and are used to access various resources at Missouri S&T, such as the computing network and the computers and software in Technology Classrooms (TC). Most Missouri S&T IT services require an authorized computer account (user id and password) to gain access. The following services are available through IT computer accounts:

- Access through the Missouri S&T account
- E-mail
- Network file storage
- Access to the campus network
- Setting up Computer Accounts
Computing Technology
Missouri S&T IT provides a wide variety of computing and networking facilities and support. These facilities include, but are not limited to:

- **Windows**
- **Mac’s**
- **Linux systems**

Technology Classroom
Computer Learning Centers (CLCs) are computing sites provided to support academic computing and teaching methodologies. 32 CLCs are located in various buildings around campus. Use of computers in these locations is restricted to Missouri S&T faculty, staff, and students. A list of CLC locations, hours of operation, installed software and equipment is available online at http://helpdesk.mst.edu.

Computing Resources
Missouri S&T IT provides access to computing, networking and information resources in support of teaching, research and other official duties of the university. Access to the computing resources and facilities is a privilege, not a right. The “Missouri S&T Computing and Network Facilities Acceptable Use Policy” describes the ethical and legal responsibilities regarding computing resources.

Privileges and Responsibilities
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Individual Owned Computers
Missouri S&T IT in conjunction with the Missouri S&T Bookstore provides recommendations for supported hardware and software to those wishing to purchase for personal use.

Academically priced software for personally owned machines is provided through licensing agreements with various vendors. Missouri S&T IT provides Microsoft Outlook to students free of charge on the “Get Connected CD” (available from the IT Walk-In Center, see Getting Help) and McAfee Anti-virus is available for free download at: http://helpdesk.mst.edu/antivirus.html.

Please visit http://www.mstbookstore.com and click on the “MINERTECH” logo for more information on supported technology and recommended systems.

Computing Resources
Missouri S&T IT provides a wide variety of computing resources. Missouri S&T IT is using the different computing systems on campus.

Help is available on a wide range of items from the Windows-based PCs, Macintoshes and Linux workstations to the supported software on these systems.

Members of the campus community may call 573-341-HELP or access the online Help Request system at helpdesk.mst.edu. Hours of operation are available by visiting helpdesk.mst.edu.

Internet Resources
- **Online Help Request - http://helpdesk.mst.edu**
- **Missouri S&T - http://www.mst.edu**
- **Solution Center - http://helpdesk.mst.edu**
- **IT Support - http://helpdesk.mst.edu/ITsupport**
- **IT Security - http://helpdesk.mst.edu/ITsecurity**
- **Campus Library - http://library.mst.edu**
- **Joe’s SSL - http://jess.mst.edu**

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Other computing policies and procedures, including the University of Missouri policies, can be found at: http://it.mst.edu/policies/index.html.

Individually Owned Computers
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Connecting to the Network
Computers in campus residence halls and fraternities or sororities connect to the network through an Ethernet connection or via wireless connection. Wireless coverage currently extends to over 70% of the campus (including the Residential College); providing great flexibility and convenience for members of the campus community.

To register a machine on the campus network, simply plug-in to an available Ethernet jack and open a web browser, an online registration page will load, complete the form and you are ready to access the network. Detailed instructions on connecting to the network, using either wired or wireless Ethernet, are available at http://helpdesk.mst.edu/students/network/index.html. Virtual Private Network (VPN) connections are available allowing members of the campus community to connect to the network while away from campus or traveling.

Special usage policies apply to network connections; see the “Policies and Procedures” web page at http://it.mst.edu/policies/index.html. In addition, Ethernet cards (both wired and wireless) and cables may be purchased through the Missouri S&T Bookstore which is located in the Havener Center.

Counseling and Academic Support Programs

The staff of Academic Support Programs provide professional consultation and assistance regarding academic motivation, attitude, and approach to the learning process. Call to make an appointment anytime of the year.

The Student Learning Center (204 Norwood) is adjacent to the Academic Support Programs office. It is a place to study and where you’ll have access to a computer learning center, LEAD (Learning Enhancement Across Disciplines) peer tutoring, and much more.

Resource Learning Center is located at Thomas Jefferson Hall, Room G-7, as well as 204 Norwood and is a great study place where you can access old course files, a resource library, a copy machine, and computers. The convenient location is great for residents. Who said you can’t study in your PJ’s?

What you’ll find at Academic Support Programs office and the Student Learning Center, 203 & 204 Norwood Hall:

- Great atmosphere for studying and working with others
- LEAD peer tutoring (see schedule at http://lead.mst.edu)
- Computer Learning Center
- Academic Support Resource Library
- Free coffee and a friendly staff
- Old student course files to use as study tools
- Study techniques and test taking strategies
- Learning consultation to discover your most effective learning style

You will find a virtual academic support center at our website too!

Academic Support Programs operates Disability Support Services, which provides accommodations for qualified students. These services are designed to provide students with equal educational opportunities. Services available to qualified students can include classroom accommodation, alternative testing environment, books on tape, and assistance in overall access on campus. If you have a disability or are limited in some way, contact Disability Support Services to request accommodations. University policy and procedures can be found at http://lead.mst.edu or call for an appointment, 341-4221.

The Testing Center, also operated by Academic Support Programs, administers national tests like the CLEP test, GRE, Miller Analogies Test, CBASE and PRAXIS. Correspondence course testing services is also available. A range of personality, interest, and skills assessment instruments are available to assist the Counseling Center clients with personal, academic and career concerns. Students desiring to test out of courses, take a test for correspondence courses, or having any other testing needs can contact the Testing Center at 341-4222. Visit our website for more information: http://testcenter.mst.edu.

Academic Assistance on Campus
Learning Enhancement Across Disciplines (LEAD) Program - http://lead.mst.edu. The LEAD program offers learning forums for students who wish to improve their understanding of concepts and their mastery of skills in a wide variety of introductory courses to achieve their full potential.

Learning Centers
The LEAD program sponsors open-environment Learning Centers for several large enrollment introductory courses. Disciplined-based faculty and undergraduate peer instructors staff the centers during fixed hours each week. Students are encouraged to work in interactive groups to solve problems and to develop strategies, guided and validated by the experts on duty. The centers are designed not only to help students with course content, but to also help them gain professional skills in communication, problem solving and teamwork.

Free Tutoring
Scheduled drop-in tutoring is available at fixed locations for a large number of introductory and foundational courses. It focuses on individual and small-group interactions. The undergraduate peer tutors are accomplished in the course material, trained by professional LEAD staff and communicate with LEAD faculty mentors in the associated disciplines.

For further information about LEAD or the current semester schedule of academic assistance, call 341-7070 or check the website at http://lead.mst.edu.

There are several other sources of academic assistance at Missouri S&T that students can access to improve their understanding of and proficiency with course material and learning process.

- Professors can clarify concepts or refer students to peers or resources that can provide academic assistance
- Counseling, 204 Norwood Hall, ext. 4281, 341-4281, http://counseling.mst.edu
- Study skill reference material at the Van Maire Resource Center, Library, 341-4227, http://library.mst.edu
- Music and Fine Arts
Music and fine arts abound at Missouri S&T. Our student union Board sponsors plays, lectures, films, dances, and concerts. The campus also benefits from the Campus Performing Arts Series and the Missouri S&T Film Series.

Leach Theater is a modern theater with computerized lighting and sound systems. The equipment allows the facility to support a variety of events such as St. Louis Symphony, Broadway Productions, Alvin Aliley Dance Ensemble and The Chinese Magic Revue. Performances also are available locally through the Ozark Actors Theatre and the Regional Opera Company. The Remmers Special Artist/Lecture Series has brought to campus such speakers as former Prime Secretary of State Henry Kissinger, former Prime Minister of Britain Margaret Thatcher, business journalist Louis Rukeyser, Colin Powell, Itzhak Perlman. CBS News correspondent Charles Kuralt, former Prime Secretary of State Henry Kissinger, former Prime Minister of Britain Margaret Thatcher, business journalist Louis Rukeyser, Colin Powell, Itzhak Perlman.
Co-op and Internship Programs

Students seeking Computer Science co-op academic credit (CS 202) must receive pre-approval** from the departmental co-op coordinator (Department Chair) and register for it in the semester they are on co-op. For the number of credit hours agreed to by the coordinator. Upon completion of the co-op, students need to submit a 1-2 page report to the coordinator as well as to the COC. The report must include the following:

- Student information
- Employer information
- Period of employment
- A detailed account of all computer science related work done during the co-op
- Supervisor’s name and signature indicating approval of this report

CS 202 credits can only be awarded for co-ops with significant CS content, and count only towards free electives. The number of co-op credits a student can get depends on the intensity of the co-op as determined by the coordinator. Normally 3 credits are granted for a semester of full-time work.

**Please also note that before you take a co-op position, COC may need the following documents from you:
- A copy of the acceptance letter from the company with the salary and the hours
- Fill out some forms to formally get into the co-op program at the COC

Advising
In Computer Science, you will work with our freshman and transfer advisor who will create a custom plan of courses for you during your career at Missouri S&T. The advisor will utilize any previous AP credit and transfer credit from other institutions in this plan.

From the sophomore year on, you will have an advising relationship with an individual faculty member who will help you with your plan of study. Faculty can help you select classes in your area of interest. Faculty can also get you involved with undergraduate research through, for instance, the OURE program.

Undergraduate Research
There are many opportunities to join in research with faculty, graduate students, and undergraduates. In undergraduate research, you can explore a topic of individual interest and get credit (CS 390) for your work. Some of the past projects have included developing visualizations for power systems, creating edutainment software for elementary school students to learn about Computer Science, helping build evolutionary algorithms to defend against cyber attacks, and building custom interfaces for lab equipment. Undergraduate research is a great resume builder and can be a gateway into a graduate program.

The Opportunities for Undergraduate Research Experience (OURE) program, through the Office of Undergraduate Studies, has been established to expand opportunities for a more active form of learning by students, encourage the interaction of undergraduate students with faculty, expand the level of research activity on the campus, help recruit superior students into our graduate program, and demonstrate that teaching and research are compatible and mutually reinforcing.

Recreation/Sports Facilities
Campus sports and recreation facilities are available. Most of the facilities are housed in the Student Recreation Center and the Gale Bullman Multi-Purpose Building. These facilities include basketball courts, a swimming pool, weight rooms, aerobic machines, an indoor jogging track, racquetball courts, a squash court, an aerobics/martial arts room and outdoors tennis courts and intramural fields. In addition, there is also a nine-hole golf course and driving range.

All senior CS majors take the capstone course. This course gives you actual experience working with teams comprised of fellow students and practicing computer scientists. The teams design, test, and maintain variable software systems. While instruction and research are on the leading edge of computing, class size is small to facilitate the interactions of students with faculty. Whether you’re solving problems in science, business, industry, engineering, or in the lab, you will be prepared with a computer science degree from Missouri S&T.

Brief History
The Missouri University of Science and Technology introduced the first Computer Science course in 1957 and added extensive course offerings in Computer Science at both the graduate and undergraduate levels before the Master of Science degree in Computer Science was authorized in 1964. The B.S. degree in Computer Science was authorized in 1966 and the Ph.D. degree in Mathematics with emphasis in Computer Science became available in 1967. A separate department of Computer Science was established in January 1969. The Ph.D. degree in Computer Science was approved by the Board of Curators and became effective for Fall 1976.

The Department’s B.S. program holds ABET Computing Accreditation (www.abet.org). The accreditation is based on both the CS curriculum and the process management used within the department for assessment/ improvement. Missouri S&T is only one of four schools in Missouri that hold ABET computing accreditation.

Programs and Facilities

For your advanced work, you can choose to study: distributed/parallel computing/architecture, software engineering, computer security, bio-inspired computing, sensor/ wireless/computer networking, computer science, and internet computing.

Outstanding Research
Students receive instruction based on the newest developments in computing from department research. Our knowledgeable faculty are able to guide students in their research endeavors. The research funding that our faculty brings in from the federal and state agencies, as well as industry, helps the Department to stay at the cutting edge of computer science research and provides financial support for many of our students during their studies.

The Computer Science Department has two areas of excellence in teaching and research, namely Software Engineering & Critical Infrastructure Protection and Software Lifecycle.

The basic philosophy of the department, relative to the undergraduate program, is to require a broad general education, which includes at least 14 semester credit hours in mathematics (beyond algebra/trigonometry) and at least 50 semester credit hours in Computer Science. The minimum number of credit hours needed to graduate is 128. There are numerous undergraduate/graduate courses in Computer Science which to choose, see https://sites.google.com/a/mst.edu/tentative-two-year-course-schedule/

At the M.S. level, the department philosophy is to have the student take a substantial portion of his/her work in one of the principal areas. The student may choose the thesis or non-thesis option. Our current strength is in the area of computer science related work done during the co-op search for summer, cooperative training, and full-time employment. Services available include:

- Registration and Interview Sign-up
- Resume and Cover Letter Workshops
- Job Search Strategies Workshops
- Professional Interview Workshops
- Individual Appointments
- On-Campus Interviews
- Company Literature
- Career Fairs
- Resource Library
- Industry Speakers
- Job Listings

Services are also offered to alumni for entry-level and advanced job referrals.

Computer Science at Missouri University of Science and Technology
Critical Infrastructure Protection

In the department, you’ll have access to high-performance computers running Linux and Windows, and a distributed computing cluster for running parallel algorithms as well as computationally expensive sequential tasks. The department supports many programming languages including C, C++, Java, Perl, Python, and packages such as database systems (Oracle). Computer Learning Centers (CLCs) across campus are open 24/7, and high-speed Internet access is available in Missouri S&T residence halls, most Greek houses and in the community.

Computer Facilities & Research Laboratories

The Computer Science Department at Missouri S&T makes use of both its own laboratories as well as the University Computing Facilities. The Department maintains the laboratories described next. Additional information for some of these laboratories can be found on the department’s web page at: http://cs.mst.edu

Web and Wireless Computing Laboratory

Is to design and carry out cutting edge research in different aspects of data management, security, compression, replication, caching, query processing, and visual (aggregation, fusion) in wireless networks and cloud computing environment. Our focus is on

Critical Infrastructure Protection Laboratories

Is to perform research on challenging issues of software engineering technology that are critical to support the development, operation and maintenance of modern software-centric systems. Our lab will enhance the competitiveness of member organizations by conducting collaborative research programs, developing joint R&D proposals to compete for state, national, and international funding, and delivering high-quality educational and training programs both on-campus and off-campus. Website: https://sites.google.com/a/mst.edu/software/
STUDENT ORGANIZATIONS

ACM Student Chapter
The Missouri University of Science and Technology student chapter of the Association for Computing Machinery was organized in 1962 and is the second one in the United States. The purpose of this active student organization is to provide information on the science and art of information processing, including the views of prominent speakers on many different Computer Science oriented topics. Topics of discussion at meetings include the study, design, development, and application of modern technology, computing techniques, and appropriate languages for general information processing, storage, retrieval, transmission/communication, and processing data of all kinds. Membership is available to everyone. I am interested in the organization’s activities, becoming involved in numerous campus computing activities, and sponsoring several informal social events each year. In 1981, the Missouri S&T Programming Team placed first in a field of ten teams at the site and first in a field of sixty teams in the Mid-Central Regional Programming Contest. ACM’s web address is http://acm.mst.edu.

ACM SIG Security
The Missouri S&T ACM Student Chapter Special Interest Group on Security (SIG Sec) is a very active student group concerned with the Computer Science aspects of security. Topics addressed by this group include computer & network security, intrusion detection & response, cyber security of infrastructure, viruses, worms, spam, ware, bots, encryption, etc. Besides a variety of presentations from invited speakers from both industry and academia, SIG Sec also organizes various special events such as canterbury building and wireless security audit competitions. SIG Sec’s main goal is the advancement of Missouri S&T students’ security awareness & knowledge. SIG Security’s web address is http://acm.mst.edu/security/

ACM-W
The Missouri S&T Association for Computing Machinery Committee on Women in Computing (ACM-W) student chapter was chartered by the ACM Chief Operating Officer on August 23, 2005. The goals of this organization are to celebrate, inform, and support women in computing, and to work with the international ACM-W community of computer scientists, educators, employers, and policy makers to improve working and learning environments for women. See http://web.mst.edu/~acm-w/ for more information.

UPE Student Chapter
Upsilon Pi Epsilon is the International Honor Society for the Computing and Information Disciplines. Missouri S&T has a chapter since 1973. Each semester outstanding undergraduate and graduate students are invited to join. Members of the student chapter provide instruction for Boy Scout Merit Badge testing. During 1977-1979, the National President of UPE was a Missouri S&T faculty member. UPE’s web address is http://web.mst.edu/~upe/.

Missouri S&T Honors Academy
The Missouri S&T Honors Academy offers students the opportunity to be a part of a community of outstanding scholars who are seeking an enhanced educational experience. This program is designed to instill honors habits to explore ways to search for answers beyond the norm of course syllabi descriptions. The rewards are earning the distinction of “Honor’s Academy Fellow” at graduation, which is noted on the diploma, transcript and commencement program.

At Missouri S&T, Honors Academy students are recognized for their academic excellence and are provided with individualized attention and opportunities to establish leadership development skills, interact with faculty members and participate in special projects including service learning, undergraduate research and other beneficial experiences.

Eligibility Requirements

Incoming freshmen are eligible to apply if:
1. Their ACT score is a 29 or higher/SAT is 1440 or above, &
2. They rank in the top 10% of their high school class or have a minimum GPA of 3.5.

Incoming transfer students and students currently enrolled at Missouri S&T are eligible to apply if:
1. They have a minimum GPA of 3.5, &
2. A minimum of 24 graded, college-level credits.

http://uao.mst.edu/honors.html

Sriram Chellappan
Assistant Professor, Ph.D (Ohio State University, 2007)

The imprints of Computer Science have permeated many facets of life today. My research broadly focuses on social computing and computer networking, wherein I work on problems in the areas of assessing behavior from Internet usage, issues related to mobility and security in rapidly evolving networks like wireless networks and large scale distributed systems. Some representative questions that my research addresses are: how can people’s Internet usage reflect their personality; how can a bunch of tiny mobile wireless sensing devices deployed in a battlefield cooperate for tasks like intrusion detection; how can already known user mobility patterns be used to detect unauthorized usages of wireless cell phones; how to design new graphics based network authentication schemes that are much more resistant to disclosed than traditional text based passwords. For addressing the above problems, I focus on developing both sound theoretical frameworks and high performing algorithms. The above problems are exciting, challenging and very useful to study, with a host of applications and impacts immediately awaiting them. My research is supported by a grant from the National Science Foundation, University of Missouri Research Board, University Transportation Center and Army Research Office.

My teaching primarily focuses on imparting knowledge to undergraduate students in the areas of networks and their security. Apart from learning, I want my students to develop problem solving skills, critical and independent thinking, and ability to reach outside the realm of textbooks and classrooms. I will provide interesting and practical research topics and projects that will enable undergraduate students to achieve the above objectives and motivate them to further their research careers. Missouri S&T is also certified by the National Security Agency as a Center of Academic Excellence in Information Assurance, focusing on security for critical infrastructures, which further demonstrates the vast opportunities students have for pursuing courses and research in the areas of networks and security at Missouri S&T.

Maggie X. Cheng
Associate Professor, Ph.D (University of Minnesota, 2003)

I am lucky to work in an area that is related to everyone’s daily experience—computer networks. When the Internet is mature enough to connect every home and office in the world and host millions of e-business, wireless networks that eliminate the hurdle of wires and their scarcity are home and communicate to the central control unit that starts lights and your favorite devices automatically. Imagine what it would be like to live in a home that is equipped with devices capable of wireless communication. The sensors automatically detect that you are home and communicate to the central control unit that starts lights and your favorite music; when you are away, the sensors and other wireless devices automatically guard your home and report intruding, fire and flooding. However it could be frustrating too—especially after you become fully dependent on it. Network failure due to depleted battery or slow network access due to limited wireless communication bandwidth can make the whole experience very frustrating. I am working on how to work around the scarce energy resources of wireless devices and the limited wireless bandwidths, and pull out of effort to make it possible to provide a cheap yet fast and robust wireless network. I teach and research on resource-efficient wireless network protocols and related theoretical foundation. Recently I have applied these techniques to airborne networks and intelligent transportation sensor networks.

When not working, I like to think about what I can do in Rolla to make this place a more inviting environment, perhaps bringing more high-tech startups that gradually transform Rolla into the Silicon Valley in Missouri?
"Education is the manifestation of perfection already in man."

—Swami Vivekananda, a 19th Century Indian philosopher.

Indeed educating and nurturing curious young minds is my love and passion. My goal is to motivate our students to be innovative, out-of-the-box thinker. I try best to help them build strong foundation, aptitude, and problem solving skills to reach for the stars. Unless students are intellectually challenged in the classrooms, how could we expect them to be successful in real life — professional career or higher studies?

In my opinion a classroom is a living laboratory for mutual learning. I try to impart in the students fundamental concepts and insights. My teaching philosophy has been guided by the Nobel Laureate Poet Rabindranath Tagore: “A teacher can never truly teach unless he is still learning himself. A lamp can never light another lamp unless it continues to burn its own flame. The teacher who has come to the end of his subject, who has no living traffic with his knowledge but merely repeats his lesson to his students, can only load their minds, he cannot quicken them.”

My teaching interests are data structures, algorithms, graph theory, wireless networks and mobile computing, sensor networks, and pervasive computing.

I enjoy class teaching as much as mentoring undergraduate and graduate theses and doctoral dissertations. My broad research interests include theory and practice of wireless and sensor networks, mobile and pervasive computing, distributed and cloud computing, cyber-physical systems and smart environments, energy and sustainability, smart healthcare, security and privacy, biological and social networks, applied graph theory and game theory. To know a bit of my research contributions, Google “DBLP: Sajal K. Das” or look up Google Scholar.

What’s my personal interest? Well … mathematics, magic, juggling, traveling, soccer and Indian music! I like fun-loving people too.

**Fikret Ercal**

Professor, Ph.D (Ohio State University, 1988)

My recent research work is in Bioinformatics, particularly in “Gene Family Identification”. I regularly collaborate with colleagues from Biological Sciences on research project related to Bioinformatics. My PhD work was in parallel and distributed computing. Therefore, I always prefer to work in areas of science and engineering where high performance computing is critically needed. Bioinformatics, computer vision, and image processing are such areas. I have published many articles in these areas and served on the editorial boards of several journals. I am an IEEE Golden Core Member, the recipient of Meritorious Service Award from IEEE Computer Society in 2001, and the recipient of three Faculty Excellence Awards from Missouri S&T and a Best Paper Award.

I teach the operating systems, algorithms, and the parallel programming classes. In my spare time, I am an avid tennis player. My other hobbies are movies, scuba diving, and skiing.

**Wei Jiang**

Assistant Professor, Ph.D (Purdue University, 2008)

Privacy and data utility are often perceived to be at odds. An omniscient data source would have many benefits in support of data analysis and information retrieval. However, an omniscient data source raises issues such as the growing problem of identity theft. What we need is the ability to compute the desired “beneficial outcome” of sharing data. Transparent data sharing and analysis extends that beneficial outcome to non-omniscient data sources. Within the scope of MDAS, we distinguish three classes of services: broadcast based services, on-demand based services and pervasive based services.

In addition to research, I am also very excited about teaching. Learning class materials is important, and even more important for students is to become independent learners and work effectively in a team. I am often exhilarated to see students’ eagerness to attack difficult problems and challenge my input in a mutually respectful way. I am always willing to spend more time in assisting students in any possible way. Teaching is a learning process as well, and learning from students and colleagues will definitely improve my teaching skills and knowledge.

When I have time, I like sleeping, swimming and watching college football. My favorite college football team is the Iowa Hawkeyes.
My research interests range broadly in end-user programming environments, with particular focus on database accessibility and analysis, and scientific visualization. I have pursued those interests through research projects in the field of bioinformatics, wherein the end-users are scientists (untrained as programmers or IT professionals) who need to analyze large quantities of complex data. In particular, I have been interested in developing and studying the use of software tools that will allow such end-users to use powerful information technology to enhance their research, without the need for traditional programming training.

My current research involves qualitative spatial reasoning over a collection of 3D objects, a task that plays an important role in a variety of problem domains, including biomedical analyses, geographic information systems, and modeling of mechanical parts. In addition to the functional and logical consistency that is required for such a system, clearly there is a need for a graphical user interface that will allow the user to interactively view and manipulate the objects and the spatial relationships between them. Additionally, consideration must be given to representing how those spatial relations change over time. We are extending a 2D region connection calculus to VRCC-3D, a visual programming environment that facilitates reasoning over a collection of 3D objects. This system effectively allows the user to create "visual programs", utilizing a region connection calculus to identify and enforce the spatial constraints that logically must hold between the objects over a sequence of abstract time periods. Not only does this system provide spatio-temporal reasoning to discover RCC-8 relations between 3D objects, it also provides support for occlusion between the corresponding objects.

In my spare time, I am an avid Kansas City Chiefs and Chicago Bears football fan.

Dan Lin
Assistant Professor, Ph.D (University of Singapore, 2008)

My research interests cover many areas in the fields of database systems and information security. I have been working on moving object databases for more than five years. Applications related to moving objects (e.g., vehicles, users of wireless devices) have become more and more popular. For example, in function deployment methods, or e-commerce applications, the system can help store, send out advertisements, or e-commerce applications, to vehicles passing by or within the store region. Such applications contain a large amount of frequently updated moving objects which cannot be well supported by the traditional databases. Therefore, I have proposed several novel indexing and querying techniques for efficiently managing moving objects. Recently, I am also interested in the topic of location privacy protection which aims to protect users’ location information from being disclosed to unauthorized parties.

My research in one topic has helped me find new research problems in others, and inspired new ways of solving them. During my research, I enjoy the collaborations with people from different areas and I feel that the combination of passions from different fields will lead to new discoveries and technologies.

According to my research experience, I will teach the database systems course (338) this semester. I will introduce the most advanced topics at the end of this course and look forward to seeing you in my class.

Besides research and teaching, I like traveling. I enjoy seeing beautiful scenes as well as getting to know different cultures.

Jennifer Leopold
Associate Professor, Ph.D (University of Kansas, 1999)

My research interests cover many areas in the fields of database systems and information technology to enhance their research, without the need for traditional programming training.

My current research involves qualitative spatial reasoning over a collection of 3D objects, a task that plays an important role in a variety of problem domains, including biomedical analyses, geographic information systems, and modeling of mechanical parts. In addition to the functional and logical consistency that is required for such a system, clearly there is a need for a graphical user interface that will allow the user to interactively view and manipulate the objects and the spatial relationships between them. Additionally, consideration must be given to representing how those spatial relations change over time. We are extending a 2D region connection calculus to VRCC-3D, a visual programming environment that facilitates reasoning over a collection of 3D objects. This system effectively allows the user to create "visual programs", utilizing a region connection calculus to identify and enforce the spatial constraints that logically must hold between the objects over a sequence of abstract time periods. Not only does this system provide spatio-temporal reasoning to discover RCC-8 relations between 3D objects, it also provides support for occlusion between the corresponding objects.

In my spare time, I am an avid Kansas City Chiefs and Chicago Bears football fan.

Sanjay Madria
Professor, Ph.D (Indian Institute of Technology, Delhi 1995)

My research revolves around mobile data management, cloud computing, and security issues in wireless sensor networks. The applications like border patrolling, monitoring chemical leakage, troop movements in a battle field require constant sensing capabilities using tiny sensors. In the Web and Wireless Computing Lab, I have miniature devices called motes which can self organize themselves to create a wireless sensor network and can start sending data to a given base station. The problems of handling data, managing security and handling attacks are much more severe in this environment due to limitations on battery power [AA batteries], memory [128KB] and CPU speed [7Mhz]. So I work on designing light weight algorithms to handle data, provide secure passage of data to the base station and detect the presence of any malicious node in the path. I address issues like how to detect a malicious node which collects all data , but never forwards it, or forwards it to another part of the network, or it will create fake identities. A node can also aggregate sensing data and may change the values like reporting the false number of troop movement, thus, the base station needs to verify that the reported data is correctly aggregated. More importantly, we experiment with real sensors which is really fun!!

My other area of research is mobile P2P computing where I am involved in designing replica allocation schemes to increase availability using Economic models. My view is mobile P2P will be successful only if users are given incentives to provide services and in return they get services by exchanging some virtual currencies. More recently, I have started working in the area of cloud computing so if you want to know more, visit http://www.mst.edu/~cswebd.

My teaching is related to learning data management in various environment like in a traditional centralized setting (CS 338 and CS 238), in a wireless environment (CS 467) and, in Internet (CS 477). I am also teaching CS 401, a new class on Cloud Computing. I teach and supervise students including undergraduates in these areas. In my free time (which I hardly get) I love gardening, and playing with my kids. I love walking on trails and hiking. As part of my professional and personal visits, I have been to more than 37 countries and a few countries which I often visit includes India and Japan.
This is an exciting time for Computer Science – CS pervades virtually every aspect of modern society. It’s also a time of danger; complex systems consisting of multiple computers (distributed computing systems) manage critical infrastructures such as power grids, automated highways, and air traffic systems. These are vulnerable to massive failures and cyber (security) attacks. If you don’t believe this, just imagine what it’s like for the power to be out for an extended period of time or being on an airplane that crashes into another airplane! How about protecting your privacy when someone can snoop into your house to learn that, not only is your TV on, but also what you’re watching. Thus, I’m really interested in how to create sound theory and practice of fault tolerance and security for distributed computing applications.

I work a lot with other disciplines on campus and around the country to apply these techniques to various applications. There is a real potential to have an impact on society through applying computer science to Critical Infrastructure Protection.

My teaching revolves around helping you, as the student, to learn these techniques of how to construct solid, sound, fault-tolerance, correct, and secure systems. We learn these in the classroom, and there are many opportunities for undergraduate research in this area. As a graduate, many of my students have gone on to very interesting positions within industry and have continued on to graduate school. Missouri S&T is also certified by the National Security Agency as a Center of Academic Excellence in Information Assurance, focusing on security for critical infrastructures. The National Science Foundation and other agencies sponsor this work; you can read more about my work at http://web.mst.edu/~ff/research.htm and our NSA security certification at http://cae.mst.edu.

Not all of life is work, and, as hobbies, I like to garden and to cook and go to really nice restaurants. Often you will be subjected to my odd sense of humor in class.

I recently arrived to Missouri S&T, and quickly found that this is a great University to both teach and learn. I enjoy the challenges of computer programming and I primarily teach Sophomore and Junior classes that have a strong programming component.

Programming is a constructive art. Its learning requires dedication and lots of practice. In CS 153 and CS 253, I will guide you through the process building correct programs with carefully selected examples and exercises. Programming and problem solving will appear frustrating at times but in the end it will be very intellectually rewarding.

Teaching Interests
CS 153 : Data Structures
CS 128 : Discrete Mathematics For Computer Science
CS 253 : Algorithms
CS 356 : Theory of Computer Science
CS 347 : Introduction To Artificial Intelligence
CS 356 : The Structure Of A Compiler

As the freshman and transfer student advisor for the CS department undergraduate students, I will be your primary conduit of information about this department. As a first year student, I will be your academic advisor. I will guide you through many of the “hoops” that you encounter in any new adventure. Beginning college studies can be a bit overwhelming at times, but it doesn’t need to be. You must always remember one thing: don’t be afraid to ask questions. You will often start with your academic advisor. My goal is to familiarize you with the system here on the campus so that you will be able to navigate your way through to a victorious graduation.

In addition to advising, I coordinate the introductory programming course, CS 53/54. You will gain a solid foundation in programming using a high-level object-oriented language (C++), enabling you to master the data structures course and subsequent computer science course work. Most likely you will pick up other languages along the way. In CS 53, my staff of graduate teaching assistants and I will strive to teach not just the programming language, but the difficult art of problem solving. As a computer scientist, you will be involved with the search for solutions to a myriad of problem types. Thus, you must be adept at applying standard solution techniques, but also developing new, innovative ideas.

We will teach you to think analytically. At the same time, we will make this class fun. Past and future assignments include games and simulations. It will be a tough course, but you will be rewarded with a deep understanding of the programming language, the object-oriented paradigm, and the problem solving process.

As an upperclassman, you may have me as an instructor for one of the numerical analysis courses. You are required to take the CS 228 course, where you will learn basics of solving problems in mathematics on the real line by “discretizing” the processes. In CS 328, a non-required course, you will carry this idea to a much higher level. Both are exciting and challenging courses.

I too came to this campus as a freshman many years ago. I came because of the history and reputation of the campus. It is a wonderful place to study, to live, to make friends, and to launch a career. This university will not let you down!
Modern society is faced with ever more complex problems that have so many potential solutions that even all the computers on the planet put together cannot exhaustively try them all to determine the best solution. Think of, for example, developing new cancer medications, modeling the stock market, designing super efficient circuit diagrams, identifying the most critical threats to our critical infrastructures and corresponding defenses, and many more! These problems have in common the extremely large number of potential solutions as well as that we do not need necessarily the theoretically best solution, but would be satisfied with a ‘good enough’ solution. Heuristic search algorithms are a type of algorithm which employs ‘rules of thumb’ to efficiently search for a ‘good enough’ solution; they obtain their efficiency at the expense of losing any guarantee of finding the theoretical best solution. My favorite type of heuristic search algorithm is the Evolutionary Algorithm (EA), because it performs well over a wide variety of really hard types of problems. EAs are stochastic, population-based heuristic search algorithms inspired by neo-Darwinian evolution theory and Mendelian genetics. My EA research can be divided into two main categories: (1) solving hard real-world problems with custom EAs (often working together with faculty & students from other departments on campus), and (2) designing increasingly sophisticated types of EAs (for instance by finding inspiration in nature or society).

Most of my teaching is focused on helping students learn the fundamental concepts, algorithmic design & analysis, and implementation & application of classic Artificial Intelligence search algorithms (CS347) and EAs (CS348 & CS448). These are exciting areas of Computer Science and skills from these classes are highly marketable. I also teach heavily via distance education (http://dce.mst.edu) so you can take courses from Missouri S&T while on your co-op experiences.

I still live in St. Louis and drive in every day bright and early for my 8 AM class. Hope to see you there!
Bachelor of Science in Computer Science - Suggested Course of Study

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<tr>
<td>1</td>
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<td>Comp Sc 238 - File Struct &amp; Inter Database Sys</td>
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**NOTES**

1. Any science lecture-laboratory course or course pair totaling at least four hours credit. The laboratory is mandatory in all cases. These courses may be selected from: Chem 1, 2 and 4; Chem 5, Bio Sc 110 and 111; Physics 10 (or 11) and 10; Geology 51 and 52; Geology 54 and Bio Sci 115 and 116.
2. Any ten hours that includes courses from at least two of the following areas: economics, history, political science, psychology, or sociology. One course must satisfy the Missouri and St. Louis University requirements.
3. Any science lecture-laboratory course or course pair totaling at least four hours credit. A course must be selected from: Chem 1, 2, 4, and 5; Bio Sci 110 and 111; Physics 10 (or 11) and 10; Geology 51 and 52; Geology 54 and Bio Sci 115 and 116.
4. Any science lecture-laboratory course or course pair totaling at least four hours credit. The laboratory is mandatory in all cases. These courses may be selected from: Chem 1, 2, 4, and 5; Bio Sci 110 and 111; Physics 10 (or 11) and 10; Geology 51 and 52; Geology 54 and Bio Sci 115 and 116.
5. Any science lecture-laboratory course or course pair totaling at least four hours credit. The laboratory is mandatory in all cases. These courses may be selected from: Chem 1, 2, 4, and 5; Bio Sci 110 and 111; Physics 10 (or 11) and 10; Geology 51 and 52; Geology 54 and Bio Sci 115 and 116.
6. Any science lecture-laboratory course or course pair totaling at least four hours credit. The laboratory is mandatory in all cases. These courses may be selected from: Chem 1, 2, 4, and 5; Bio Sci 110 and 111; Physics 10 (or 11) and 10; Geology 51 and 52; Geology 54 and Bio Sci 115 and 116.
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COMPUTER SCIENCE CURRICULUM BY DISCIPLINE

COMPUTER SCIENCE
Introduction to Computer Science (CS 1)
Introduction to Programming (CS 53)
Introduction to Programming Lab (CS 54)
Data Structures I (CS 153)
Discrete Math for Computer Science (CS 128)
Software Engineering I (CS 206)
Introduction to Numerical Methods (CS 228)
Theory of Computer Science (CS 220)
Programming Languages/Translators (CS 256)
Introduction to File Processing (CS 238)
Introduction to Operating Systems (CS 284)
Software Systems Development I (CS 397)
Elective I
Elective II
Elective III
Elective IV
Elective V

COMPUTER ENGINEERING
Introduction to Computer Engineering (CpE 111)
Digital Systems Design (CpE 213)

MATHEMATICS/STATISTICS
Calculus & Analytic Geometry I (Math 8 or 14)
Calculus & Analytic Geometry II (Math 21 or 15)
Linear Algebra (Math 208 or 203)
Statistics (Stat 213 or 215 or 217 or 343)

COMMUNICATION
Exposition and Argumentation (Eng 20)
Writing and Research (Eng 60 or Eng 160)
Speech (Sp/MS 85 or Sp/MS 283)

LABORATORY SCIENCE
(one Lecture/Lab combo from the following list)
Life Science 110, 112
Chemistry 1, 2, 4
Physics 9, 10
Geology 51, 53 or 52, 54

SCIENCE & ENGINEERING
Engineering Physics I (Phys 23 or Phys 21-22)
Engineering Physics II (Phys 24 or Phys 25-26)
Elective I
Elective II
Elective III

CONSTITUTIONAL REQUIREMENT
Elective (History 112 or 175 or 176 or Pol Sc 90)

HUMANITIES/SOCIAL SCIENCE
Humanities/Social Science Elective I
Humanities/Social Science Elective II
Humanities/Social Science Elective III
Humanities/Social Science Elective IV

ETHICS
Philosophy 225 or 235 or 340 or 368

LITERATURE
Elective I
FREE ELECTIVES
(to bring total hours to 128)

FREE ELECTIVES
(to bring total hours to 128)

GRADUATION REQUIREMENTS
A minimum of 128 credit hours is required for a Bachelor of Science degree in Computer Science and an average of at least two grade points per credit hour must be obtained. All computer science majors must earn a “C” or better grade in each of the following courses: CS 53, CS 54, CS 153, CS 128 (158), and CS 253. All computer science majors must earn a minimum cumulative grade point average of 2.00 for all computer science courses presented to satisfy the required and elective computer science requirements.
A minor in Computer Science is designed to support the students major program. The minor offers versatility to enhance the chosen major. The education design encourages the student to take a more give purposeful and effective pattern for the college work outside the major field. By listing the minor on a transcript, the abilities and interests of the student will be emphasized.

To achieve a minor in Computer Science a student must complete:
- CS 53 with a grade of C or better.
- CS 153 with a grade of C or better.
- An additional 12 credit hours of CS courses above and beyond CS 153.
- “* Co-listed courses can only be counted towards a minor in CS if a student is registered under the CS title.

** At most 6 of the 18 minor credits can be transfer credits. All transfer courses must show a grade of C or better.

If CS 128 and/or CS 253 will be used for a CS minor, a student must score a C or better in these.

The overall grade point average of all minor courses must be a C or better.

Obtain an Application for Minor form and complete it by listing all CS courses taken along with grade received and semester taken. Once completed, sign and turn the form in to the CS main office to obtain the needed CS Minor Advisor and Department Chair signatures.

Current Courses in Computer Science

1. Introduction To Computer Science (LEC 1.0) This course is designed to cover the

2. Programming and development work good organization and development of applications. Topics included are syntax, semantics, logic, relational and arithmetic operators, decision branches, loops, functions, input/output formatting, Catenization, and an introduction to Object-Oriented Programming including the development and use of classes. Prerequisite: Accompanied by Cmp Sci 54.

3. Introduction To Programming (LAB 1.0) Practical applications of concepts learned in Computer Science. Hands-on instruction in C++ development, debugging, and testing programming projects. Prerequisite: Accompanied by Cmp Sci 53.

4. Introduction To Programming Laboratory (LAB 1.0) Practical applications of concepts learned in Computer Science. Hands-on instruction in C++ development, debugging, and testing programming projects. Prerequisite: Accompanied by Cmp Sci 53.

5. Basic Scientific Programming (LEC 2.0) Introduction to the structure of programs and programming techniques in Fortran to solve science and engineering problems. Topics include data representation, basic solutions of numerical problems, and the debugging and documentation of programs. Prerequisites: Enforce requirements.

6. Introduction To Programming Methodology (LEC 2.0) Basic structure of programming and problem solving techniques using C++. Development, debugging, and testing of simple applications. Topics include syntax, semantics, operators, loops, decision branches, arrays, file I/O.

7. Computer Programming Laboratory (LAB 1.0) A laboratory to accompany Cmp Sci 73 which emphasizes the design, writing and debugging of programs in Fortran. Prerequisite: Accompanied by Cmp Sci 73.

8. Programming Methodology Laboratory (LAB 1.0) A hands-on introduction to structured programming in C++. Development, coding, debugging, and testing of structured programs are discussed in Computer Science 74. Prerequisite: Accompanied by Cmp Sci 74.

9. Special Topics (Variable 0.0-6.0) This course is designed to give the department an opportunity to test a new course. Variable title.

10. Digital Forensics (LEC 3.0) The knowledge of computer and network forensics has become essential in securing today’s network-centric environment. This course will give the students both the fundamental knowledge and hands-on experience in computer and network forensics including data collection, data preservation and analysis and legal sources. Prerequisites: Cmp Sci 263 and Cmp Sci 284.

11. Cooperative Work Training (IND 1.0-8.0) On-the-job experience gained through cooperative training with industry, with credit arranged through departmental cooperative advisor. Grade received depends on quality of reports submitted and work supervisors evaluation. Not more than 8 hours may be applied to the B.S. degree.

12. Software Engineering I (LEC 3.0) Development of methodologies useful in the software engineering classical life cycle. This includes: requirements, design, implementation, and testing phases. These methodologies are reinforced through utilization of a CASE tool and a group project. Prerequisite: Cmp Sci 253, and at least junior standing.

13. Seminar (IND 0.0-6.0) Discussion of current topics.

14. Introduction To Data Mining (LEC 3.0) This course provides an introduction and teaming methods which can be applied to predict unknown or future values of variables, or to find human-interpretable patterns that describe data. Topics may include classification, clustering, association rule discovery, sequential pattern discovery, regression, and deviation/anomaly detection. Prerequisites: Cmp Sci 238 and Stat 213 or Stat 215 or Stat 217 or Stat 343.

15. Agile Software Development (LEC 3.0) Principles and methods of agile software development and contrast them with prescriptive practices. Specifically, this course will cover the following topics: agile development and testing requirements, design, implementation, test processes; understand how a particular process promotes quality, cost, time, and stakeholder project and measure project progress and productivity. Prerequisite: Cmp Sci 206.
347 Introduction To Artificial Intelligence (LEC 3.0) A modern introduction to AI, covering important topics of current interest such as search algorithms, heuristics, game trees, knowledge representation, reasoning, computational intelligence, and machine learning. Students will implement course concepts covering selected AI topics. Prerequisite: Comp Sci 253.

348 Evolutionary Computing (LEC 3.0) Introduces evolutionary algorithms, a class of stochastic, population-based algorithms inspired by natural evolution theory (e.g., genetic algorithms), capable of solving complex problems for which other techniques fail. Students will implement course concepts, tackling science, engineering and/or business problems. Prerequisite: Comp Sci 253 and a statistics course.

354 Mathematical Logic I (LEC 3.0) A mathematical introduction to logic with some applications. Functional and relational languages, satisfaction, soundness and completeness theorems, compactness theorems. Examples from Mathematics, Philosophy, Computer Science, and/or Computer Engineering. Prerequisite: Philos 15 with junior standing or Math 305 or 118 — Computer Science Comp Sci 253 or Comp Eng 111. (Co-listed with Comp Eng 354, Philos 354 and Math 354).

356 The Structure Of A Compiler (LEC 3.0) Review of Blackac normal form language descriptions and basic parsing concepts. Polals and matrix notation as intermediate forms, and target code representation. Introduction to the basic building blocks of a compiler: syntax scanning, expression translation, symbol table manipulation, code generation, local optimization, and storage allocation. Prerequisite: Comp Sci 256 and Comp Sci 253.

358 Interactive Computer Graphics (LEC 3.0) Applications and functional capabilities of current computer graphics systems. Interactive graphics-programming including windowing, clipping, segmentation, mathematical modeling, two and three dimensional transformations, data structures, perspective views, anti-aliasing, and software design. Prerequisite: Comp Sci 228 and Comp Sci 253.

362 Security Operations & Program Management (LEC 3.0) An overview of information security operations, access control, risk management, systems and application life cycle management, physical security, business continuity planning, telecommunications security, disaster recovery, software piracy, investigations, ethics and more. There will be extensive reporting, planning and policy writing. Prerequisite: Writing Emphasized course, Operating Systems, policy writing. Prerequisite: Writing Emphasized course, Operating Systems, and Computer Networking.

365 Computer Communications And Networks (LEC 3.0) Network architecture and model including physical protocols for data transmission and error detection/correction, data link concepts, LAN protocols, inter-networking, reliable end to end service, security, and application services. Students will implement course concepts on an actual computer network. Prerequisite: Comp Sci 284.

366 Regression Analysis (LEC 3.0) Simple linear regression, multiple regression, regression diagnostics, multicollinearity, measures of influence and leverage, model selection techniques, polynomial models, regression with autocorrelated errors, introduction to non-linear regression. Prerequisites: Math 22 and one of Stat 211, 213, 215, 217, or 343. (Co-listed with Stat 346).

381 The Structure Of Operating Systems (LEC 3.0) The hardware and software requirements for operating systems for uniprogramming, multiprogramming, multiprocessing, time sharing, real time, and virtual systems. The concepts of supervisors, interrupt handlers, input/output control systems, and memory mapping are discussed in detail. Prerequisite: Comp Sci 284.

384 Distributed Operating Systems (LEC 3.0) The study of modern operating systems, particularly distributed operating systems. Topics include a review of network systems, inter-process communication, causality, distributed state maintenance, failure detection, reconfiguration and recovery, load balancing, distributed file systems, distributed mutual exclusion, and stable property detection, including deadlock detection. A group project in distributed systems programming will be required. Prerequisite: CS 253 and CS 284.

387 Parallel Programming With MPI (LEC 3.0) Parallel and pipelined algorithms, architectures, network topologies, message passing, process scheduling and synchronization. Parallel programming on clusters. Cost, speedup and efficiency analysis. Prerequisite: Comp Sci 284 and Comp Sci 253.

388 Introduction to High Performance Computer Architecture (LEC 3.0) Overviews high performance architecture of computing systems and covers various architectural/hardware and software/algorithms means that enhance performance. Uniprocessor and concurrent systems are investigated. Various computational models are studied and linked to commercial systems. Prerequisites: Comp Eng 213, Comp Sci 253.

390 Undergraduate Research (IND 0.0-6.0) Designed for the undergraduate student who wishes to engage in research. Does not lead to the preparation of a thesis. Not more than six (6) credit hours allowed for graduation credit. Subject and credit to be arranged with the faculty supervisor.

397 Software Systems Development I (LEC 3.0) Classes will work in small teams to develop a complete software system beginning with end-user interviews and concluding with end-user training. Prerequisites: Comp Sci 206 and 100 credit hours completed.

398 Software Systems Development II (LEC 3.0) This course is an optional continuation of Comp Sci 397. Those interested in project management should take this course since participants become officers or group leaders in the class “corporation.” This course is especially important for those going straight into industry upon graduation. Students with coop experience may find this course redundant. Prerequisite: Comp Sci 397.

399 Software Systems Development III (LEC 3.0) A modern introduction to Artificial Intelligence with some applications. Functional and relational languages, satisfaction, soundness and completeness theorems, compactness theorems. Examples from Mathematics, Philosophy, Computer Science, and/or Computer Engineering. Prerequisite: Philos 15 with junior standing or Math 305 or 118 — Computer Science Comp Sci 253 or Comp Eng 111. (Co-listed with Comp Eng 354, Philos 354 and Math 354).

Missouri S&T is the first Missouri University to become a National Center of Academic Excellence in Information Assurance Education (CAEIAE) and in research (CAE-R). The designation is offered jointly by the U.S. National Security Agency and Department of Homeland Security. Missouri S&T is a member of an elite group of universities that meet the federal government’s criteria for providing educational and research opportunities in cyber-security.

The CAEIAE/CAE-R program is designed to reduce vulnerabilities in the national information infrastructure by promoting the study of “information assurance” in U.S. colleges and universities. The program also is designed to promote information assurance expertise in various disciplines. Missouri S&T offers a unique contribution to the information assurance field with our focus on developing ways to protect the nation’s electric power grid, oil, gas and water distribution systems, and transportation systems from terrorist attack.

For more information about the certification, visit the Missouri S&T CAEIAE / CAE-R website at http://cae.mst.edu.

Missouri S&T is certified as mapping to 100% of the Committee on National Security Systems (CNSS) National Standards 4011 (National Training Standard for Information Systems Security (INFOSEC) Professionals) and 4014E (Information Assurance Training Standard for Information Systems Security Officers (ISSO)). This Information Assurance Courseware Evaluation (IACE) Program implements a process to systematically assess the degree to which the courseware from commercial, government, and academic sources maps to the national standards set by the Committee on National Security Systems (CNSS). The IACE Program is currently managed by the National Information Assurance Education and Training Program Office within the Information Assurance Directorate at NSA. The goal of the IACE Program is to expand the use of national standards in information assurance education and training throughout the nation. These standards were developed for the government, but have been kept unclassified to share with the greater IA community.

Students take the following courses to meet this certification:

- CPE 349 - Trustworthy, Survivable Computer Networks
- CPE 449/SYSENG 449 - Network-Centric Systems Reliability and Security*
- CS 284 - Introduction to Operating Systems
- CS 317 - Intellectual Property for Computer Scientists
- CS 562 - Security Operations & Program Management
- CS 365 - Computer Communications and Networks

*Undergraduate students with at least a 3.5 cumulative GPA may be approved to take 449
CS Academy

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MISSION
(1) To recognize computer science graduates who have provided outstanding leadership, have attained significant levels of professional achievement and success and who demonstrate high standards of personal and professional integrity.

(2) To provide advisory guidance and counsel at the call of the Dean of the College of Arts and Sciences, Chair of Computer Science, faculty, or students of the department.

(3) To strengthen the dedication and understanding of students to computer science through personal and professional example.

(4) To partner with the Computer Science Department to develop, advance and sponsor key programs of both the Academy and the department by identifying, securing, and providing financial support.

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Consultancy
Provide consultation and input for the Department on ways to improve the quality of the Department, the programs, and the learning environment.

Ambassadorship
Assist the Department by communicating the Department’s goals, programs, needs, and contributions to the community.

Sponsorship
Advance the objectives of the Department by identifying, securing, and providing resources needed for a successful program.
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