1. **Software Design and Development**: Software Testing and Quality Assurance (CS 307): unit to system level; Object-Oriented Analysis and Design (CS 308): principles and methodologies; Software Engineering II (CS 406): life cycle metrics; Software Requirements Engineering (CS 409): multiple requirements perspectives

2. **Wireless Networks and Mobile Systems**: Computer Communications and Networks (CS 365): architecture and implementation; Computer Security (CS 463): information flow; Mobile and Sensor Data Management (CS 467): system architecture and implementation; Advanced Network Security (CS 468): Network security issues; Heterogeneous and Mobile Databases (CS 438): multidatabase systems; Pervasive Computing (CS 401): seamlessly integrate computing

3. **Information Systems and Cloud Computing**: Introduction to Data Mining (CS 301): classical data mining; Cloud Computing (CS 401): Cloud computing architecture; Heterogeneous and Mobile Databases (CS 438): multidatabase systems;


5. **Computational Intelligence**: Introduction to Artificial Intelligence (CS 347): search heuristics and complexity; Evolutionary Computing (CS 348): theory and application; Advanced Topics in Artificial Intelligence (CS 447): research methods in artificial intelligence; Advanced Evolutionary Computing (CS 448): research methods in evolutionary computing; Data Mining and Knowledge Discovery (CS 444): knowledge representation and acquisition

6. **Systems and Software Architecture**: Software Intensive Systems Architecting (SysEng 470): architecting complex software; Software Requirements Engineering (CmpSci 409): software engineering; Object-Oriented Analysis and Design (CmpSci 308): explore principles, mechanisms, & methodologies; Model Based Systems Engineering (SysEng 435/CmpSci 405): models to represent systems

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**at a glance**

**Campus**
- Missouri's premier technological research university
- Founded in 1870 as Missouri School of Mines (MSM)

**Location**
- Our 284-acre campus is located in Rolla, Mo., a town of 18,000 in the heart of the Ozarks.

**Enrollment**
- 7,200 students – 5,500 undergraduate, 1,700 graduate
- 14 award-winning student design teams
- 200-plus student organizations
- Students from 47 states and 51 nations

**Reputation**
- NSA National Center of Academic Excellence in Information Assurance Education (CAEIAE) (2007-12) and Research (2008-13)
- Ranked 25th in the nation in engineering master’s degrees awarded (2002-03)
- Ranked 45th in the nation in engineering doctoral degrees

**Contact Information**

**Computer Science Department**

Graduate Coordinator
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Email: csgradcoord@mst.edu
Website: cs.mst.edu

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Check out other department courses.
[cs.mst.edu/academicprograms/dce](cs.mst.edu/academicprograms/dce)
Graduate certificate programs give students the opportunity to increase their knowledge in specific areas of interest. These courses provide students with the latest knowledge and skills in strategic areas of computing and are presented by Missouri S&T instructors who are experts in their fields. The certificates are tailored toward working professionals to expand their experiences at an advanced level. The certificate forms a bridge to the master’s degree program in computer science for those who wish to further their study.

Course delivery

The certificate courses are offered through distance education. Distance education courses use streaming Internet video for course delivery. In this setting students actively participate in classes through viewing the class on their computer while being interactively connected by telephone. Lectures are archived so they may be reviewed at any time during the semester. Instructors are available outside of class time by email and telephone.

Software Design and Development

The software design and development certificate provides an attractive option for the working professional to expand their experience in software engineering. The core of four classes gives a treatment of software project management in its many roles, from overall project management and process improvement to the management of individual lifecycle components, including software deployment and evolution. Specialized coursework gives depth in advanced object-oriented design, software quality, testing theory and practice, and an advanced treatment of software metrics.

Multimedia and Informations Systems

The multimedia and information systems certificate is tailored to the working professional who wants to expand their knowledge of advanced data management technologies. Object-oriented database structure, data mining, web database, bioinformatics, and multimedia storage and retrieval techniques form the core of the study.

Wireless Networks and Mobile Systems

The wireless networks and mobile systems certificate is designed to provide the working professional with an intensive treatment in wireless systems and applications.

Program coverage includes network architecture and protocols, computer communication and networking basics, principles of network security, and techniques for preventing, detecting and recovering from attacks; as well as advanced topics that address the specific issues and challenges in the wireless and mobile environment, including wireless network provisioning and deployment, location and mobility management, security and privacy, attacks and countermeasures, mobile computing applications, and data management in networked sensor systems.

Information Assurance and Security Officer Essentials

Protecting information systems is key to protecting the nation’s critical infrastructures. Only through diligence and a well-trained workforce will we be able to adequately defend the nation’s vital information resources.

Computational Intelligence

This graduate certificate program provides practicing engineers the opportunity to develop the necessary skills in the use and development of computational intelligence algorithms based on evolutionary computation, neural networks, fuzzy logic, and complex systems theory.

Engineers can also learn how to integrate common sense reasoning with computational intelligence elective courses such as data mining and knowledge discovery.

Systems and Software Architecture

The systems and software architect fills a critical role in today’s development process, transforming market inputs into the requirements and architecture specification of a product that independent (often remote) development teams can implement.

Missouri S&T is Certified by the National Security Agency (NSA) Committee on National Security Systems (CNSS) for National Standards 4011 (National Training Standard for Information Systems Security (INFOSEC) Professionals) and 4014E (Information Assurance Training Standard for Information Systems Security Officers (ISSO)). The NSA’s 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 CNSS.