

Master of Science in Applied Computer Science

The Master of Science with major in Applied Computer Science for Experienced Professionals (MSACS) is a thirty-six hour graduate degree program. Coursework in the following areas will be included: Embedded Systems Computing Systems Software Engineering Principles N-tier Client/Server Systems Parallel & Distributed Systems Distributed Object Technology. The MSACS is perfect for working professionals with industry experience in computing and information technology interested in obtaining a graduate degree in computer science, concurrent with work commitments. Courses will be offered in a cohort/learning-community allowing students to complete the program in 22 months (5 semesters including a summer semester). The program is approachable for students with modest technical backgrounds, and does not require an undergraduate degree in computer science. Graduates will be awarded certifications in Embedded Systems and a chosen professional certification.

Web-Based Instruction Delivery

Classes will meet in person and on-campus only every third week. Instruction will be delivered using web-based technologies for the other class meetings, supplemented by study group teams, and ad-hoc meetings. Lectures will be delivered using synchronous distance learning technology over the web, where students attend class over the web at an assigned time, or view the archived lecture at their convenience. Real-time interaction between the students and professor will be supported using online “chat” facilities and white-board. The use of distance-learning technology and staggered on-campus meetings is intended to accommodate “non-traditional” students balancing work with graduate study.

Individual Lab Equipment

The non-traditional technology-based instruction delivery component of the MSACS program requires that students have off-campus access to laboratory components. Courses with

hardware-specific lab experiments (embedded systems) will be conducted using hardware and equipment issued to each student for home and off-campus use. In addition, the CSIS department maintains a faculty development and graduate student resource room with laboratory equipment available for student use.

General Requirements for Admission to the MSACS Program

1. An undergraduate degree from an accredited institution is required. The program is open to various majors with appropriate backgrounds who can master the foundations, and is not restricted to undergraduate degrees in science and engineering.
2. Minimum cumulative undergraduate adjusted GPA of 2.75 on a 4.0 scale.
3. Experience in the computing industry is required. This can include both part-time and full time experience.
4. Coursework in the following prerequisite foundations are required:
 - a. applied calculus
 - b. physics
 - c. computer programming
 - d. computer architecture
 - e. data structures

Work experience and other coursework can selectively replace certain prerequisite knowledge foundations at the discretion of the program director with demonstration of student competency in the knowledge area.
5. Minimum score of 1425 (verbal, quantitative and analytical) on the General Test of the Graduate Record Examination (GRE).
6. Other criteria will be considered by the MSACS Admissions Committee for applicants, including:
 - course work
 - major area coursework GPA
 - professional certifications in computing areas
 - relevant work experience
 - professional activities
7. International Students must submit a minimum TOEFL score of at least 600 to be considered for admission.

8. Valid Immunization Certificate for measles, mumps, and rubella.

Program Fees

The cost of the MSACS program is \$25,000 for five (5) semesters of course work.

Grades in Graduate Courses

Expectations for satisfactory graduate level student performance are detailed in Academic Policies section of this catalog.

Petition to Graduate

Each MSACS candidate must petition to graduate at least one semester prior to completion of program requirements. The student must contact the MSACS program office and request a petition. Applications should meet with their advisor or the MSACS director and complete a graduation checklist prior to submitting their petition to the KSU registrar's office.

Foundation Courses

Students lacking formal preparation may be required to complete one or more of the following computing foundations courses. These courses are designed to provide an individually tailored program of study in computer science foundations, and will be delivered in an online self-study format. The prerequisites for these courses are program admission.

CS 8001 Computer Hardware **1 Hour**

A study of basic computer hardware components and devices including floppy and hard disk drives, monitor technologies, printers, digital scanners and cameras, optical storage devices, backup devices, raid technology, Intel and AMD processor generations. The course will also discuss the differences (and similarities) between workstations, PCs, mainframes, servers, and supercomputers.

CS 8002 Computer Networking **1 Hour**

A study of basic networking methods, technologies, devices and technologies.

CS 8003 Elementary Data Structures **1 Hour**

A study of elementary data structures including arrays, lists, and trees, along with simple methods for sorting and searching.

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Credit Hours

REQUIRED TRADITIONAL COURSEWORK 27

CS 8421	Computing Systems	3
CS 8422	Advanced Computing Systems	3
CS 8431	Software Engineering	3
CS 8532	Advanced Software Engineering	3
CS 8411	Embedded Systems and Micro-controllers	3
CS 8512	Advanced Embedded Systems and Micro-controllers	3
CS 8625	High-Performance Computing	3
CS 8628	N-Tier Client-Server Systems	3
CS 8635	Distributed Object Technology	3

Non-Traditional Applied Studies 9

Students will complete 9 credit hours of study of current applied computer science topics, including seminars and lectures as part of the Distinguished Speaker Lecture Series, a Special Topics course of study (LINUX or ORACLE certification), and a Directed Study (includes group travel to a conference to learn the latest in embedded and real-time systems technology).

CS 8910	Professional Seminar	3
CS 8940	Directed Study	3
CS 8990	Special Topics	3

MSACS Distinguished Speaker Lecture Series. Three credit hours of CS 8910 Professional Seminars over three semesters.

Professional Certifications: In addition to receiving the Embedded Systems Certification as part of the program course requirements, students will complete a professional certification program. Each program consists of 144 hours of hands-on continuing education study in either LINUX systems administration or ORACLE database administration, and will receive 3 hours of graduate credit upon completion of all certification requirements.

Embedded Systems Conference: Students will travel as a group to attend one of the four embedded systems conferences offered yearly around the country. Students will attend 5 days of intensive study in current topics in embedded and real-time systems. Each student will select one topic for further independent research and study upon return from the conference, culminating in a presentation to students and faculty.

PROGRAM TOTAL: 36

MSACS Course Descriptions

CS 8001. Computer Hardware. 1-0-1.

Prerequisite: Admission to the MSACS program.

A study of basic computer hardware components and devices. Topics include storage, monitor technologies, printers, digital scanners and cameras, optical storage devices, backup devices, raid technology, processor generations, workstations, PCs, mainframes, servers, and supercomputers.

CS 8002. Computer Networking. 1-0-1.

Prerequisite: Admission to the MSACS program.

A study of basic networking methods, topologies, devices and technologies.

CS 8003. Elementary Data Structures. 1-0-1.

Prerequisite: Admission to the MSACS program.

A study of elementary data structures including arrays, lists, and trees, along with simple methods for sorting and searching.

CS 8411. Embedded Systems and Microcontrollers. 3-0-3.

Prerequisite: Admission to the MSACS program.

An introduction to embedded systems, embedded systems programming, microcontrollers and embedded system analysis and design. Discussion of real-time systems, operating systems, timing constraints and execution size limitations. Laboratory experience will realize theoretical concepts.

CS 8421. Computing Systems. 3-0-3.

Prerequisite: Admission to the MSACS program.

This course is the first in a sequence of two required core courses building a high level of competency in computing systems. The sequence builds content in the following knowledge areas: architecture performance enhancements, advanced computer architectures, data communications, networking protocols. Topics include caching, pipelines, super-scalar architectures, multiprocessors, multi-computers, networking, network protocols, and Internet protocols. Includes a review of basic computer architecture.

CS 8422. Advanced Computing Systems. 3-0-3.

Prerequisite: CS 8421 Computing Systems.

This second course in the sequence continues the study of computing systems concentrating on networking and operating systems and covers

distributed and networked systems. Topics include CPU time management, memory management, storage management, process control, synchronization and deadlock, distributed operating systems, data communications, networking protocols, distributed systems, distributed cache coherence.

CS 8431. Software Engineering. 3-0-3.

Prerequisite: Admission to the MSACS program.

Techniques and formal methods in modern software design and engineering. Coverage of UML, design patterns and frameworks.

CS 8512. Advanced Embedded Systems and Microcontrollers. 3-0-3.

Prerequisite: CS 8411 Embedded Systems and completion of CS 8001, 8002, 8003.

A continuation of Embedded Systems, with emphasis on interfacing, networking, and real-time systems analysis and design.

CS 8532. Advanced Software Engineering. 3-0-3.

Prerequisite: CS 8431 Software Engineering and completion of CS 8001, 8002, 8003.

A study of the use of simulation in the design and verification of complex software systems, specifically including real-time systems with hard timing constraints.

CS 8625. High Performance Computing. 3-0-3.

Prerequisite: CS 8422 Advanced Computing Systems and completion of CS 8001, 8002, 8003.

A study of high-performance computing systems and architectures, programming techniques, theoretical and practical parallel speedup alternative mechanisms and limitations. Include a brief introduction to Quantum Computing principles and projected application.

CS 8628. N-Tier Client-Server Systems. 3-0-3.

Prerequisite: CS 8421 Computing Systems and CS 8001, 8002, and 8003 OR IS 8040 Data Communication Theory and Practice.

A study of modern N-Tier Client Server systems that form the foundation for distributed computing systems. This course dovetails with the software-oriented orientation of CS 8635 Distributed Object Technology. Integrated topic spanning computer architecture, networking, middleware, operating systems, client-server system design.

CS 8635. Distributed Object Technology. 3-0-3.

Prerequisite: CS 8628 *N-Tier Client/Server Architectures* and CS 8532 *Advanced Software Engineering*.

A presentation of Networks, UNIX and programming including inter-process communication, communication protocols, OSI mode, security, file transfer protocols, printer spoolers, remote command execution, remote login/ access, performance and procedure calls.

CS 8910. Professional Seminar. 1-0-1.

Students will complete three hours of CS 8910 Professional Seminar.

CS 8916. Coop. 3-0-3.

Prerequisite: *Permission of Program Director.*

Students may receive credit for coop and internship work through this course.

CS 8918. Internship. 3-0-3.

Prerequisite: *Permission of Program Director.*

Students may receive credit for coop and internship work through this course.

CS 8940. Directed Study. 1 to 3.

Requires permission of the Program Director and a faculty sponsor/mentor.

CS 8990. Special Topics. 1 to 3.

Prerequisite: *Permission of Program Director.*

Current topics in applied computer science, offered on an as needed basis.

