

Applied Computer Science

Master of Science in Applied Computer Science (MSACS)

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The Master of Science with major in Applied Computer Science for Experienced Professionals (MSACS) is a thirty-six hour graduate degree program with coursework in the following areas:

- Software Architecture
- Embedded Systems
- Bio-Informatics
- Software Engineering
- Digital Game Design
- Computing Systems
- Robotics and A.I.
- Bio-Med Devices
- Database Administration
- Parallel & Distributed Systems
- Distributed Object Technology

Through choice of electives, students may concentrate in one of five areas:

- Software Engineering and Architecture
- Embedded Systems and Robotics
- Distributed Computing
- Bio-Med Computing
- Digital Game Design

Additionally, students may choose electives from multiple areas.

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 are offered in a cohort/learning-community allowing students to complete the program in 22 months (five 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.

A thesis option is available to students with undergraduate degrees in computer science and computer engineering.

Web-Based Instruction Delivery

Instruction is delivered both on campus and at a distance, using web-based technologies, allowing students to attend lectures on campus, or remote and live from work or home. All lectures are also recorded allowing students to view the archived lectures at their convenience. Real-time interaction between the students and professor will be supported using Voice-over-IP and online “chat” and application sharing.

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.

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The Fall admission is available for students with computing industry experience and degrees in fields other than Computer Science, while the Spring admission requires a degree in a Computer Science or a closely related discipline.

Fall Admission Requirements

1. An undergraduate degree from an accredited institution is required. Fall admission is open to various majors with appropriate backgrounds who can master the foundations, and is not restricted to undergraduate degrees in science and engineering, while the Spring admission requires a degree in a Computer Science or a closely related discipline.
2. Minimum cumulative undergraduate adjusted GPA of 2.75 on a 4.0 scale.
3. Experience in the computing industry is desired. This can include both part-time and full time experience.
4. Coursework in the following prerequisite foundations are required:
 - a. mathematics
 - b. physical science (basic electricity)
 - 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. Additional foundation-building courses are available and may be required in: basic electricity, computer architecture, and data structures and may be completed during the student’s first two semesters.

5. Official GRE test scores. Although no specific minimum score is required, the applicant’s GRE score will be considered in the competitive review process.
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 applicants must submit a TOEFL score .

Spring Admission Requirements

Spring admission requires undergraduate degree in a computing field from an accredited institution. In general, an undergraduate degree in computer science, computer engineering or a technical information systems program is sufficient for Spring Admission.

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 complete a petition to graduate at least one semester prior to completion of program requirements. The petition will be reviewed by the MSACS director to ensure that all graduation requirements are being met, prior to submission to the KSU registrar’s office.

Financial Information for MSACS Program

A. Premium Pricing

The MSACS Premium Program includes premium features that enrich the student's education with a variety of resources and experiences. The cost of the program is \$5000 per semester over five semesters for \$25,000 total. This tuition includes fees, books and class materials, access to lectures using distance learning technology, recorded lectures, a graduation banquet and hooding ceremony, and other premium features currently including: a laptop, PDA, digital logic lab kit including microprocessor and components, membership in the Association for Computing Machinery (ACM), and optional research project.

B. Financial Aid

All MSACS applicants are encouraged to apply for financial aid in the event of an emergency that could prevent them from fulfilling their commitment to the program.

C. Fee Schedule and Deadlines

Tuition is prorated over the length of the program, with a payment of \$5000 due on or before the first day of class for each of the five semesters.

D. Payment of Fees

Methods of Payment

Payment of this fee and the \$5000 semester tuition fee can be made by check or cash.

- Checks are sent to the Kennesaw State University, Bursar's Office, 1000 Chastain Road, MB #0503, Kennesaw, GA 30144-5591.
- Cash payments must be made at the Cashier's Window in the Student Center.

If Tuition is Paid by Company (Third Party Payment)

In most instances, a company will not pay tuition until after grades are assigned. To set up this method of payment, the student must request the company to send a Letter of Authorization the Bursar's Office, Kennesaw State University, 1000 Chastain Road, Kennesaw, GA 30144-5591, at the beginning of the semester. The letter must include the following information:

- Student's name and social security number for whom tuition will be paid;
- Semester for which tuition will be paid;
- Amount of tuition that the company will pay;
- Copy of page(s) from Human Resource Manual stating the tuition payment or reimbursement policy of that company.

At the end of the semester, the student is responsible for requesting from the registrar a verification request letter confirming the semester and the grade received for the courses. Payment from the company is due no later than 15 days after the beginning of the following semester. The student is responsible for any amount not covered by the company. Unpaid balances should be paid at the beginning of the semester. If the student cannot cover the cost at the beginning of the semester, a Promissory Note must be signed by the student indicating a specific date before the end of the current semester when the balance will be paid in full.

Any questions regarding payment of tuition should be directed to the Program Coordinator in the Department of Computer Science and Information Systems, located in the Ann & John Clendenin Computer Science building, or telephone 770-423-6005.

E. Refund Policy for Withdrawing from Classes

The following refund policy is in effect:

- Students withdrawing within the first two weeks during which classes are held each semester, will receive a 70% refund less expenses already incurred.
- Students withdrawing from classes after the first two weeks but prior to or on the "last day to withdraw from classes" of a semester of classes will receive a 40% refund less expenses already incurred.
- Students withdrawing from classes after the "official last day to withdraw from classes" will receive no refund.

MSACS students are responsible for notifying the Director when they plan to withdraw from the program. A withdrawal Form must be filled out, signed by the student and delivered to the Registrar's Office before a student

is officially withdrawn from the class. A copy of this form and accompanying letter are sent to Student Accounts.

Foundation Courses

Students lacking formal preparation in selected areas may be required to complete one or more of the following computing foundation courses, based on admissions evaluation. 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 6009 Concepts in Computer Science 1 Hour

An overview of the discipline of computer science, and exposition of our MSACS program’s “Applied” computer science orientation. Will also include a discussion of the expectations of the graduate student in the sciences. Lectures will also cover key and fundamental “great ideas” and innovations in the science of computing.

CS 6001 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 6002 Computer Networking 1 Hour

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

CS 6003 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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There are three models for students to complete the requirements for the MSACS degree: a Fall and Spring entry into the cohort, and a Thesis Option model.

		Credit Hours
Fall admission required coursework		21
CS 8421	Computing Systems	3
CS 8422	Advanced Computing Systems	3
CS 8430	Object-Oriented Software Design	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
* Courses common to both fall and spring admissions		
Spring admission required coursework		21
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 8635	Distributed Object Technology	3

	Credit Hours
Additional electives	
or	
CS 8990 Special Topics	6
* Courses common to both fall and spring semesters	
Electives (9 hours required)	9
Choose either:	
CSIS 8570 BIO-MED Devices	3
or	
CS 8625 High-Performance Computing	3
Choose either:	
CSIS 8630 Database Administration	3
or	
CS 8680 Digital Game Design	3
Choose either:	
CS 8628 Software Architecture	3
or	
CS 8650 Introduction to A.I. and Robotics	3
or	
CS 8670 BIO-Informatics	3
Applied Studies (6 hours required):	6
Students will complete six hours of applied studies, which may include research, applied research, projects, professional certification, additional elective coursework, and professional conferences.	
CS 6940 Research and Project Planning	1
CS 8940 Directed Study	5

A formal detailed project proposal and plan must be completed and approved by a faculty sponsor and by the program director prior to beginning work on the Directed Study hours.

PROGRAM TOTAL: 36

THESIS OPTION MODEL

A thesis option is available to students with undergraduate degrees in computer science and computer engineering.

	Credit Hours
Thesis Option Required Coursework	6
CS 8411 Embedded Systems and Micro-controllers	3
CS 8625 High-Performance Computing	3
Thesis Option Elective Coursework (Choose 21 hours)	21
CS 8431 Software Engineering	3
CS 8532 Advanced Software Engineering	3
CS 8512 Advanced Embedded Systems and Micro-controllers	3
CS 8570 Bio-Med Devices	3
CS 8628 Software Architecture	3
CS 8630 Database	3
CS 8635 Distributed Object Technology	3

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(Thesis Option Model - cont'd)

		Credit Hours
CS 8655	Digital Game Design	3
CS 8650	Intro to A.I. and Robotics	3
CS 8670	BIO-Informatics	3
CS 8990	Special Topics (may be taken more than once)	3

Applied Studies (3 hours required) 3

Students will complete three hours of applied studies, which may include research, applied research, projects, professional certification, additional elective coursework, and professional conferences.

CS 6940	Research and Project Planning	1
CS 8940	Directed Study	2

A formal detailed project proposal and plan must be completed and approved by a faculty sponsor and by the program director prior to beginning work on the Directed Study hours.

Thesis (6 hours required) 6

Students will complete six hours of CS 8999 Thesis Research

CS 8998	Thesis I (minimum of three hours required)	(variable hours 1-3)
CS 8999	Thesis II (three hours required)	3

PROGRAM TOTAL: 36

MSACS Course Descriptions

CS 6000. Concepts in Computer Science. 1-0-1.

Prerequisite: Admission to the MSACS program.

An overview of the discipline of computer science, and exposition of the MSACS program's "Applied" computer science orientation. This course includes a discussion of the expectations of graduate students in the sciences. Lectures will also cover key and fundamental "great ideas" or innovations of the science of computers.

CS 6001. 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 6002. Computer Networking. 1-0-1.

Prerequisite: Admission to the MSACS program.

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

CS 6003. 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 6810. Strategic Computing. 1-0-1.

Prerequisite: Admission to the MSACS program.

Reading, lectures, and discussion on the changing reality of computing, computer science, and computing technology in the information age. This course exposes MSACS graduate students to the forces that are changing the computing industry and computing careers. Globalization and the internet have reduced barriers to international competition and the movement of technology jobs beyond our national borders. Strategic computing views computing technology as an infrastructure component, but also a competitive advantage for business firms and nations.

CS 6820. Computing in the Global Economy. 1-0-1.

Prerequisite: Admission to the MSACS program.

Reading, lectures, and discussion on the effect of globalization and the internet on computing and computing careers. Global competition is pressuring past assumptions about computing careers and the educational process of preparing

graduates. This course exposes MSACS graduate students to these international forces that are changing the computing industry in the U.S.

CS 6940. Research and Project Planning. 1-0-1.

Prerequisite: Admission to the MSACS program. Students in this course will develop a plan-of-study for completing the requirements for the Master of Science in Applied Computer Science to include a detailed plan for completing the five hours of applied studies required to graduate. Applied studies hours may be dedicated to research, applied projects, professional certifications and conference presentation and travel.

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. 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 8430. Object-Oriented Software Analysis and Design. 3-0-3.

Prerequisite: Admission to the MSACS program. This course covers topics in Object-Oriented Software analysis, design, and development along

with an introduction to the study of algorithms and data structures. Topics include basic analysis and design concepts; problem solving and programming with Java; and data structures.

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 and completion of CS 6001, 6002, 6003.

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 and completion of CS 6001, 6002, 6003.

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 8570. BioMed Devices. 3-0-3.

Prerequisite: Admission to MSACS program.

This is a survey and project/lab course that overviews current computing technologies embedded in biological and medical devices. Students work with a handful of technology implementations currently in use in the industry and complete a small prototype design.

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

Prerequisite: CS 8628, CS 8422, CS 8512.

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. Software Architecture. 3-0-3.

Prerequisite: CS 8630.

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 8630. Database Administration. 3-0-3.

Prerequisite: CS 8422.

An introductory course in database administration. Students will learn database theory, with hands-on applications.

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

Prerequisite: CS 8628 and CS 8532.

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 8650. Introduction to A.I. and Robotics. 3-0-3.

Prerequisite: CS 8512.

This survey course covers topics in Artificial Intelligence and Robotics. A survey of AI methods and approaches from search methods to neural networks will include hands-on with expert systems. A robotics kit will be included to allow students to analyze, design, build, and test simple robotic systems.

CS 8670. Introduction to Bio-Informatics. 3-0-3.

Prerequisite: Admission to MSACS program.

Students will understand the theoretical data manipulation strategies fundamental to bioinformatics, and will examine the successful application domains and techniques. Students will apply their knowledge through programming and database exercises.

CS 8680. Digital Game Design. 3-0-3.

Prerequisite: Admission to MSACS program.

Introduction to computer game design and artificial intelligence for computer game playing, with practical projects in game design for computers. The game design component will include graphics, human-computer interface design, real-time response programming and game strategy "intelligence". Students explore game design and programming using a software system and language compiler targeted for the standard personal computer.

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.

CS 8997. Thesis Research. 1-3.

Prerequisite: Permission of Program Director.

Variable number of graduate credit hours per semester for students needing additional time to complete their thesis. Student works under the direction of a thesis director and committee chair.

CS 8998. Thesis I. 1 to 3.

Prerequisite: Permission of Program Director.

Variable number of graduate credit hours per semester for work under the direction of a thesis director and committee chair.

CS 8999. Thesis II. 3-0-3 (variable).

Prerequisite: Permission of Program Director.

Variable number of graduate credit hours per semester for work under the direction of a thesis director and committee chair.