MASTER OF COMPUTATIONAL SCIENCE AND ENGINEERING (MCSE) DEGREE

Program Learning Outcomes for the MCSE Degree

Upon completing the MCSE degree, students will be able to:

1. Acquire broad, advanced knowledge in modern computational techniques.
2. Possess skills to identify, formulate, and solve advance technical problems related to one of the focus areas.
3. Communicate technical ideas effectively.

Requirements for the MCSE Degree

The MCSE degree is a non-thesis master's degree. For general university requirements, please see Non-Thesis Master's Degrees (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-non-thesis-masters-degrees/). For additional requirements, regulations, and procedures for all graduate programs, please see All Graduate Students (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/). Students pursuing the MCSE degree must complete:

- A minimum of 30 credit hours to satisfy degree requirements.
- A minimum of 30 credit hours of graduate-level study (graduate semester credit hours, coursework at the 500-level or above).
- A minimum of 24 graduate semester credit hours must be taken at Rice University.
- A minimum of 24 graduate semester credit hours must be taken in standard or traditional courses (with a course type of lecture, seminar, laboratory, lecture/laboratory).
- A minimum residency enrollment of one fall or spring semester of part-time graduate study at Rice University.
- A maximum of 2 courses (6 graduate semester credit hours) from transfer credit. For additional departmental guidelines regarding transfer credit, see the Policies (p. 2) tab.
- A minimum overall GPA of 2.67 or higher in all Rice coursework.
- A minimum program GPA of 2.67 or higher in all Rice coursework that satisfies requirements for the non-thesis master's degree.

The Master in Computational Science and Engineering (MCSE) degree in the School of Engineering is a non-thesis degree program designed to provide training and expertise in computational science and engineering and in data engineering and analytics. The MCSE degree program is intended for students interested in technical and managerial positions such as computational scientist, computational engineering, data engineering, and data analyst. The program offers students opportunities to specialize in areas such as scientific computing, high-performance computing, data analytics, data engineering, data science, and machine learning.

The departments of Computational and Applied Mathematics (CAAM) and Statistics (STAT) jointly offer the MCSE degree program. When applying to the MCSE degree program, students must select CAAM or STAT as their desired home department. If admitted, MCSE students are admitted to a select cohort from the home department selected in their application.

The courses listed below satisfy the requirements for this degree program. In certain instances, courses not on this official list may be substituted upon approval of the program's academic advisor, or where applicable, the department or program's Director of Graduate Studies. Course substitutions must be formally applied and entered into Degree Works by the department or program's Official Certifier (https://registrar.rice.edu/facstaff/degreeworks/officialcertifier/). Additionally, these must be approved by the Office of Graduate and Postdoctoral Studies. Students and their academic advisors should identify and clearly document the courses to be taken.

Summary

Code	Title	Credit Hours
Total Credit Hours Required for the MCSE Degree		30

Degree Requirements

Code	Title	Credit Hours
Core Requirements		
Select 1 course from each of the following three groups:		*9*
Computational and Applied Mathematics (CAAM)		
CAAM 536 / CEVE 555	NUMERICAL METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS [1]	
CAAM 550	NUMERICAL ANALYSIS I [1]	
CAAM 551	NUMERICAL LINEAR ALGEBRA [1]	
CAAM 554	ITERATIVE METHODS FOR SYSTEMS OF EQUATIONS AND UNCONSTRAINED OPTIMIZATION [1]	
CAAM 571	LINEAR AND INTEGER PROGRAMMING [1]	
Computer Science (COMP)		
COMP 504	GRADUATE OBJECT-ORIENTED PROGRAMMING AND DESIGN	
COMP 530	DATABASE SYSTEM IMPLEMENTATION	
COMP 533	INTRODUCTION TO DATABASE SYSTEMS	
COMP 582 / ELEC 512	GRADUATE DESIGN AND ANALYSIS OF ALGORITHMS	
Statistics (STAT)		
STAT 502 / COMP 502 / ELEC 502	NEURAL MACHINE LEARNING I [1]	
STAT 518	PROBABILITY [1]	
STAT 519	STATISTICAL INFERENCE [1]	
STAT 541	MULTIVARIATE ANALYSIS [1]	
STAT 602 / COMP 602 / ELEC 602	NEURAL MACHINE LEARNING AND DATA MINING II [1]	
STAT 613	STATISTICAL MACHINE LEARNING [1]	
STAT 615	REGRESSION AND LINEAR MODELS [1]	
Select 3 additional courses from the home department to which you have been admitted (CAAM or STAT)		*9*
Computational and Applied Mathematics (CAAM)		
CAAM 519	COMPUTATIONAL SCIENCE I	
CAAM 520	COMPUTATIONAL SCIENCE II	

CAAM 536 / CEVE 555	NUMERICAL METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS [1]
CAAM 542	DISCONTINUOUS GALERKIN METHODS FOR SOLVING ENGINEERING PROBLEMS
CAAM 550	NUMERICAL ANALYSIS I [1]
CAAM 551	NUMERICAL LINEAR ALGEBRA [1]
CAAM 554	ITERATIVE METHODS FOR SYSTEMS OF EQUATIONS AND UNCONSTRAINED OPTIMIZATION [1]
CAAM 564	NUMERICAL OPTIMIZATION
CAAM 565	CONVEX OPTIMIZATION
CAAM 571	LINEAR AND INTEGER PROGRAMMING [1]
Statistics (STAT)	
STAT 502 / COMP 502 / ELEC 502	NEURAL MACHINE LEARNING I [1]
STAT 518	PROBABILITY [1]
STAT 519	STATISTICAL INFERENCE [1]
STAT 541	MULTIVARIATE ANALYSIS [1]
STAT 602 / COMP 602/ ELEC 602	NEURAL MACHINE LEARNING AND DATA MINING II [1]
STAT 605	R FOR DATA SCIENCE
STAT 613	STATISTICAL MACHINE LEARNING [1]
STAT 615	REGRESSION AND LINEAR MODELS [1]
STAT 616	ADVANCED STATISTICAL METHODS
STAT 648	GRAPHICAL MODELS AND NETWORKS
Elective Requirements	**12**
Technical Electives [2]	
Select 3 courses (minimum of 9 credit hours) with an MCSE advisor from coursework focused on Computational Science and Engineering, offered by the Wiess School of Natural Sciences or the George R. Brown School of Engineering.	
Communication, Leadership, Management, and Ethics	
Select a minimum of 1 course (minimum of 3 credit hours) from approved Communication, Leadership, Management, and Ethics coursework	
ENGI 501	WORKPLACE COMMUNICATION FOR PROFESSIONAL MASTER'S STUDENTS IN ENGINEERING
ENGI 510	TECHNICAL AND MANAGERIAL COMMUNICATIONS
ENGI 515	LEADING TEAMS AND INNOVATION
ENGI 528 / CEVE 528	ENGINEERING ECONOMICS
ENGI 529 / CEVE 529	ETHICS AND ENGINEERING LEADERSHIP
ENGI 542	PROFESSIONAL COMMUNICATION FOR ENGINEERING LEADERS
ENGI 555	ENGINEERING PERSUASION: HOW TO DRIVE DECISIONS AND CHANGE
ENGI 610 / NSCI 610	MANAGEMENT FOR SCIENCE AND ENGINEERING
ENGI 614	LEARNING HOW TO INNOVATE?
ENGI 615	LEADERSHIP COACHING FOR ENGINEERS
Total Credit Hours	**30**

Footnotes and Additional Information

1 If this course is completed to fulfill the Core Requirement of three groups (CAAM, COMP, or STAT), it may not be used as a course to fulfill the Core Requirement of the home department (CAAM or STAT).

2 Credit hours earned for engineering practicum, thesis, seminar, project-based courses, independent study courses, or similar variable credit hour courses may **not** be applied toward MCSE degree requirements.

Policies for the MCSE Degree

Departments of Computational and Applied Mathematics and Statistics Graduate Program Handbook

The General Announcements (GA) is the official Rice curriculum. As an additional resource for students, the departments of Computational and Applied Mathematics and Statistics, which jointly offer the MCSE degree program, publish graduate program handbooks, which can be found here:

https://gradhandbooks.rice.edu/2020_21/Computational_Applied_Mathematics_Graduate_Handbook.pdf

https://gradhandbooks.rice.edu/2020_21/Statistics_Graduate_Handbook.pdf

Application Information

Students must have completed a BA or BS degree in an engineering or science discipline, with training in engineering mathematics, statistical foundations, and programming methodology to be admitted to the program.

- Fall semester admission application deadline —February 1
- To apply to the program go to MSCE application (https://mcsegradapps.rice.edu/)
- For additional information about the program contact mcse@rice.edu
- Enrollments and degrees awarded for degree programs in the Engineering School are available at: https://engineering.rice.edu/academics/enrollment-degrees-awarded (https://engineering.rice.edu/academics/enrollment-degrees-awarded/).

Transfer Credit

For Rice University's policy regarding transfer credit, see Transfer Credit (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/#transfer). Some departments and programs have additional restrictions on transfer credit. Students are encouraged to meet with their academic program's advisor when considering transfer credit possibilities.

Program Transfer Credit Guidelines

Students pursuing the MCSE degree should be aware of the following program-specific transfer credit guidelines:

- No more than 2 courses (6 credit hours) of transfer credit from U.S. or international universities of similar standing as Rice may apply towards the degree.

- Requests for transfer credit will be considered by the program director on an individual case-by-case basis.

Additional Information

For additional information, please see the Computational Science and Engineering website: https://engrprofmasters.rice.edu/

Opportunities for the MCSE Degree

Fifth-Year Master's Degree Option for Rice Undergraduate Students

In certain situations and with some terminal master's degree programs, Rice students have an option to pursue a master's degree by adding an additional fifth year to their four years of undergraduate studies.

Advanced Rice undergraduate students in good academic standing typically apply to the master's degree program during their junior or senior year. Upon acceptance, depending on course load, financial aid status, and other variables, they may then start taking some required courses of the master's degree program. A plan of study will need to be approved by the student's undergraduate major advisor and the master's degree program director.

As part of this option and opportunity, Rice undergraduate students:

- must complete the requirements for a bachelor's degree and the master's degree independently of each other (i.e. no course may be counted toward the fulfillment of both degrees).
- should be aware there could be financial aid implications if the conversion of undergraduate coursework to that of graduate level reduces their earned undergraduate credit for any semester below that of full-time status (12 credit hours).
- more information on this *Undergraduate - Graduate Concurrent Enrollment* opportunity, including specific information on the registration process can be found here (https://ga.rice.edu/undergraduate-students/academic-opportunities/undergraduate-graduate-concurrent-enrollment/).

Rice undergraduate students completing studies in science and engineering may have the option to pursue the Master of Computational Science and Engineering (MCSE) degree. For additional information, students should contact their undergraduate major advisor and the MCSE program director.

Additional Information

For additional information, please see the Computational Science and Engineering website: https://engrprofmasters.rice.edu/