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 Applied Mathematics and Operations Research (CMOR) and Statistics (STAT) jointly offer the MCSE degree program. When applying to the MCSE degree program, students must select Computational Applied Mathematics and Operations Research (CMOR) or Statistics (STAT) as their desired area of specialization (also referred to as home department). MCSE students are admitted to the home department corresponding to the area of specialization selected in their application and this choice determines some of the core requirements for the MCSE degree.

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 course substitutions 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 Applied Mathematics and Operations Research (CMOR)		
CMOR 518	APPLICATIONS IN COMPUTATIONAL MATHEMATICS [1]	
CMOR 522	NUMERICAL ANALYSIS [1]	
CMOR 523 / CEVE 555	NUMERICAL METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS [1]	
CMOR 525	NUMERICAL LINEAR ALGEBRA [1]	
CMOR 530	ITERATIVE METHODS FOR SYSTEMS OF EQUATIONS AND UNCONSTRAINED OPTIMIZATION [1]	
Computer Science (COMP)		
COMP 504	GRADUATE OBJECT-ORIENTED PROGRAMMING AND DESIGN	
COMP 530	DATABASE SYSTEM IMPLEMENTATION	
COMP 533	INTRODUCTION TO DATABASE SYSTEMS	
COMP 543	GRADUATE TOOLS AND MODELS - DATA SCIENCE	
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 area of specialization/home department to which you have been admitted (CMOR or STAT)		*9*
Computational Applied Mathematics and Operations Research (CMOR)		
CMOR 514	INDUSTRIAL AND APPLIED DATA SCIENCE – THEORY AND PRACTICE	
CMOR 517	SCIENTIFIC MACHINE LEARNING	
CMOR 518	APPLICATIONS IN COMPUTATIONAL MATHEMATICS [1]	
CMOR 520	COMPUTATIONAL SCIENCE	
CMOR 521	HIGH PERFORMANCE COMPUTING	
CMOR 522	NUMERICAL ANALYSIS [1]	
CMOR 523 / CEVE 555	NUMERICAL METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS [1]	
CMOR 525	NUMERICAL LINEAR ALGEBRA [1]	
CMOR 527	DISCONTINUOUS GALERKIN METHODS FOR SOLVING ENGINEERING PROBLEMS	
CMOR 528	COMPUTATIONAL DIFFERENTIAL EQUATIONS	
CMOR 530	ITERATIVE METHODS FOR SYSTEMS OF EQUATIONS AND UNCONSTRAINED OPTIMIZATION [1]	
CMOR 531	CONVEX OPTIMIZATION	
CMOR 533	NUMERICAL OPTIMIZATION	
CMOR 541	LINEAR AND INTEGER PROGRAMMING [1]	
CMOR 551	SIMULATION MODELING AND ANALYSIS	
CMOR 620	TOPICS IN COMPUTATIONAL SCIENCE	
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	
STAT 687	COFES BLOCKCHAIN AND CRYPTOCURRENCIES	
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 and Computing.		
Communication, Leadership, Management, Ethics, and Practicum		
Select a minimum of 1 course (minimum of 3 credit hours) from approved Communication, Leadership, Management, Ethics, and Practicum coursework		
CMOR 595	PRACTICUM IN COMPUTATIONAL APPLIED MATHEMATICS AND OPERATIONS RESEARCH	
ENGI 501	WORKPLACE COMMUNICATION FOR PROFESSIONAL MASTER'S STUDENTS IN ENGINEERING	
ENGI 510	TECHNICAL AND MANAGERIAL COMMUNICATIONS	
ENGI 529 / CEVE 529	ETHICS AND ENGINEERING LEADERSHIP	
ENGI 530	ENGINEERING PRACTICUM	
ENGI 610 / NSCI 610	MANAGEMENT FOR SCIENCE AND ENGINEERING	
RCEL 501	ENGINEERING MANAGEMENT & LEADERSHIP THEORY AND APPLICATION	
RCEL 504	ETHICAL-TECHNICAL LEADERSHIP	
RCEL 505	ENGINEERING ECONOMICS FOR ENGINEERING LEADERS	
RCEL 610	ETHICS FOR ENGINEERS	
STAT 540	INTERNSHIP IN STATISTICAL MODELING	
Total Credit Hours		**30**

Footnotes and Additional Information

1 If this course is completed to fulfill the Core Requirement of 1 course from each of the following three groups (CMOR, COMP, or STAT), it may not be used as a course to fulfill the Core Requirement of 3 additional courses from the area of specialization/home department to which you have been admitted (CMOR or STAT).

2 Credit hours earned for 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 that jointly offer the MCSE degree program publish graduate program handbooks, which can be found here:

- https://gradhandbooks.rice.edu/2025_26/Computational_Applied_Mathematics_Operations_Research_Graduate_Handboo
- https://gradhandbooks.rice.edu/2026_27/Computer_Science_Graduate_Handbook.pdf,
- https://gradhandbooks.rice.edu/2025_26/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 the MSCE application (https://engrprofmasters.rice.edu/programs/)
- 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. Requests for transfer credit must be approved for Rice equivalency by the appropriate academic department offering the Rice equivalent course (corresponding to the subject code of the course content) and by the Office of Graduate and Postdoctoral Studies (GPS). 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 guideline:

- 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.

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/.