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 three 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 (ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-non-thesis-masters-degrees). Students pursuing the MCSE degree must complete:

- A minimum of 30 credit hours to satisfy degree requirements.

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 analytics. The MCSE degree program is intended for students interested in technical and managerial positions such as computational scientist, computational engineering, and data analyst. The program offers students opportunities to specialize in areas such as high-performance computing, data analytics, data science, machine learning, software engineering, and distributed systems.

The departments of Computational and Applied Mathematics, Computer Science, Electrical and Computer Engineering, and Statistics jointly offer the MCSE degree program. Based on preferences indicated in their applications, MCSE students are admitted to one of the following home departments: Computational and Applied Mathematics (CAAM), Computer Science (COMP), Electrical and Computer Engineering (ELEC), or Statistics (STAT).

Summary

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td></td>
<td>Total Credit Hours Required for the MCSE Degree</td>
<td>30</td>
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Degree Requirements

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Core Distribution Requirements

Select 1 course from 3 of the following 4 groups:

Group 1 (CAAM)¹

Select 1 from the following:

CAAM 519  COMPUTATIONAL SCIENCE I
CAAM 520  COMPUTATIONAL SCIENCE II

Group 2 (COMP)²

Select 1 from the following: 3-4

COMP 504  GRADUATE OBJECT-ORIENTED PROGRAMMING AND DESIGN
COMP 506  COMPILER CONSTRUCTION FOR GRADUATE STUDENTS
COMP 520  DISTRIBUTED SYSTEMS
COMP 521 / ELEC 552  OPERATING SYSTEMS AND CONCURRENT PROGRAMMING
COMP 522  MULTI-CORE COMPUTING
COMP 529  ADVANCED COMPUTER NETWORKS
COMP 530  DATABASE SYSTEM IMPLEMENTATION
COMP 533  INTRODUCTION TO DATABASE SYSTEMS
COMP 540  STATISTICAL MACHINE LEARNING
COMP 541  INTRODUCTION TO COMPUTER SECURITY
COMP 542  LARGE-SCALE MACHINE LEARNING
COMP 557 / ELEC 557  ARTIFICIAL INTELLIGENCE

Group 3 (ELEC)³

Select 1 from the following: 3-4

ELEC 513  COMPLEXITY IN MODERN SYSTEMS
ELEC 525  VIRTUALIZATION AND CLOUD RESOURCE MANAGEMENT
ELEC 526  HIGH PERFORMANCE COMPUTER ARCHITECTURE
ELEC 531  STATISTICAL SIGNAL PROCESSING
ELEC 533  INTRODUCTION TO RANDOM PROCESSES AND APPLICATIONS
ELEC 546  INTRODUCTION TO COMPUTER VISION
ELEC 547  COMPUTER VISION
ELEC 549  COMPUTATIONAL PHOTOGRAPHY
ELEC 553  MOBILE AND EMBEDDED SYSTEM DESIGN AND APPLICATION
ELEC 554  COMPUTER SYSTEMS ARCHITECTURE
ELEC 558  DIGITAL SIGNAL PROCESSING
ELEC 575  LEARNING FROM SENSOR DATA
ELEC 576  A PRACTICAL INTRODUCTION TO DEEP MACHINE LEARNING
ELEC 585  FUNDAMENTALS OF MEDICAL IMAGING I

Group 4 (STAT)⁴

Select 1 from the following: 3-4

STAT 502 / COMP 502 / ELEC 502  NEURAL MACHINE LEARNING I
STAT 518  PROBABILITY
STAT 519  STATISTICAL INFERENCE
### Master of Computational Science and Engineering (MCSE) Degree

<table>
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<tr>
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<tbody>
<tr>
<td>STAT 541</td>
<td>MULTIVARIATE ANALYSIS</td>
</tr>
<tr>
<td>STAT 602</td>
<td>NEURAL MACHINE LEARNING AND DATA MINING II</td>
</tr>
<tr>
<td>STAT 605</td>
<td>R FOR DATA SCIENCE</td>
</tr>
<tr>
<td>STAT 615</td>
<td>REGRESSION AND LINEAR MODELS</td>
</tr>
<tr>
<td>STAT 616</td>
<td>ADVANCED STATISTICAL METHODS</td>
</tr>
<tr>
<td>STAT 648</td>
<td>GRAPHICAL MODELS AND NETWORKS</td>
</tr>
</tbody>
</table>

#### Elective Requirements

**Communication, Leadership, Management and Ethics**

Select up to 6 credit hours from the following:

- ENGI 505 / CEVE 505 ENGINEERING PROJECT MANAGEMENT AND ECONOMICS
- 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 COMMUNICATION FOR ENGINEERS: BUILDING A PRACTICAL TOOLBOX
- ENGI 545 / LEAD 545 STRATEGIC THINKING FOR COMPLEX PROBLEM SOLVING
- ENGI 610 / NSCI 610 MANAGEMENT FOR SCIENCE AND ENGINEERING
- ENGI 614 LEARNING HOW TO INNOVATE?
- ENGI 615 LEADERSHIP COACHING FOR ENGINEERS

**Additional Electives**

Select additional courses from departmental CAAM, COMP, or STAT course offerings at the 500-level or above.

**Total Credit Hours**: 30

### Footnotes and Additional Information

1. A student whose home department is COMP, ELEC, or STAT has the option of satisfying Group 1 requirements by completing exactly one course from the following list:
   - CAAM 436
   - CAAM 453
   - CAAM 454
   - CAAM 471

2. A student whose home department is CAAM, ELEC, or STAT has the option of satisfying Group 2 requirements by completing exactly one course from the following list:
   - COMP 322
   - COMP 330
   - COMP 430

3. A student whose home department is CAAM, COMP, or STAT has the option of satisfying Group 3 requirements by completing exactly one course from the following list:
   - ELEC 425
   - ELEC 431

4. A student whose home department is CAAM, COMP, or ELEC has the option of satisfying Group 4 requirements by completing exactly one course from the following list:
   - STAT 310
   - STAT 405
   - STAT 410

5. Other courses may satisfy the Communication, Management, and Ethics group requirement. See advisor for more details.

6. Credit hours earned for ENGI 530 Engineering Practicum may not be applied toward MCSE degree requirements.

### Policies for the MCSE Degree

#### 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 admission deadline — February 15
- To apply to the program go to MSCE application ([https://mcsegradapps.rice.edu](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/about/enrollment-degrees-awarded](https://engineering.rice.edu/about/enrollment-degrees-awarded).

#### Transfer Credit

For Rice University’s policy regarding transfer credit, see Transfer Credit ([ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-non-thesis-masters-degrees](ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-non-thesis-masters-degrees)). 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.

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

#### Opportunities for the MCSE Degree

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