**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 advanced 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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Credit Hours Required for the MCSE Degree</td>
<td>30</td>
</tr>
</tbody>
</table>

**Degree Requirements**

**Core Distribution Requirements**

Select 1 course from 3 of the following 4 groups:

Group 1 (CAAM)¹

Select 1 from the following:

<table>
<thead>
<tr>
<th>CAAM 519</th>
<th>COMPUTATIONAL SCIENCE I</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAAM 520</td>
<td>COMPUTATIONAL SCIENCE II</td>
</tr>
</tbody>
</table>

Group 2 (COMP)²

Select 1 from the following:

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

Group 3 (ELEC)³

Select 1 from the following:

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

Group 4 (STAT)⁴

Select 1 from the following:

<table>
<thead>
<tr>
<th>STAT 502 / COMP 502 / ELEC 502</th>
<th>NEURAL MACHINE LEARNING I</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 518</td>
<td>PROBABILITY</td>
</tr>
<tr>
<td>STAT 519</td>
<td>STATISTICAL INFERENCE</td>
</tr>
</tbody>
</table>
**Master of Computational Science and Engineering (MCSE) Degree**

- **STAT 541**  
  MULTIVARIATE ANALYSIS

- **STAT 605**  
  R FOR DATA SCIENCE

- **STAT 602**  
  NEURAL MACHINE LEARNING AND DATA MINING II

- **STAT 615**  
  REGRESSION AND LINEAR MODELS

- **STAT 616**  
  ADVANCED STATISTICAL METHODS

- **STAT 648**  
  GRAPHICAL MODELS AND NETWORKS

**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?

**Additional Electives**

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

**Total Credit Hours**

30

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**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)
- 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.

**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). 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/

**Opportunities for the MCSE Degree**

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