MASTER OF ELECTRICAL AND COMPUTER ENGINEERING (MECE) DEGREE

Program Learning Outcomes for the MECE Degree

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

1. Design and implement technical solutions to real-world problems that reflect an advanced command of principles in mathematics and science.
2. Communicate effectively expert analysis of technical problems and features of proposed solutions to stakeholders.
3. Practice as an expert specialist in at least one of the major sub-fields of electrical and computer engineering.

Requirements for the MECE Degree

The MECE 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 MECE degree must complete:

- A minimum of 10 courses (30-34 credit hours, depending on course selection) 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 27 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 minimum of 3 courses (9 credit hours) from the Capstone Requirement.
  - 1 course (3 credit hours) to fulfill the Capstone Foundations requirement.
  - 2 courses (6 credit hours) to fulfill the Capstone Experience Project requirement.
- A minimum of 1 course (3 credit hours) from the Engineering Communications Requirement.
- A minimum of 2 courses (6 credit hours) from the Engineering Software Development Requirement.
- A minimum of 2 courses (6 credit hours) in one area of specialization (see below for areas of specialization). The MECE degree program offers six areas of specialization:
  - Computer Engineering (p. 2), or
  - Computer Vision (p. 2), or
  - Data Science (p. 3), or
  - Neuroengineering (p. 3), or
  - Quantum Engineering (p. 3), or
  - Wireless Systems (p. 3).
- A minimum of 2 courses (6 credit hours) from the Elective Requirements.
- ELEC 698 each semester in residence at Rice University.
- A maximum of 1 course (3 graduate semester credit hours) from transfer credit. For additional departmental guidelines regarding transfer credit, see the Policies (p. 4) tab.
- A minimum overall GPA of 2.67 or higher in all Rice coursework.
- A minimum program GPA of 3.00 or higher in all Rice coursework that satisfies requirements for the non-thesis master's degree with a minimum grade of C (2.00 grade points) in each course.

Students are admitted to the MECE degree program in the fall semester. MECE students are to consult with an academic advisor on the MECE Committee each semester in order to identify and clearly document their individual curricular requirements or degree plan to be followed.

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

<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 MECE Degree</td>
<td>30-34</td>
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Degree Requirements

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Capstone Requirement

Select 1 of the following Capstone topical areas: Computer Engineering, Computer Vision, Data Science, Neuroengineering, Quantum Engineering, or Wireless Systems

Capstone: Foundations

Select 1 course from the following:

- ELEC 522 ADVANCED VLSI DESIGN
- ELEC 551 MODERN COMMUNICATION THEORY AND PRACTICE
- ELEC 576 / COMP 576 A PRACTICAL INTRODUCTION TO DEEP MACHINE LEARNING
- ELEC 578 INTRODUCTION TO MACHINE LEARNING

Capstone: Experience Project

Select 1 from the following (minimum of 2 semesters):

- DSCI 535 / COMP 549 APPLIED MACHINE LEARNING AND DATA SCIENCE PROJECTS (2 semesters required)
- ELEC 594 MECE CAPSTONE PROJECT (2 semesters required)

Engineering Communications Requirement

Select 1 course from the following:

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<th>Credit Hours</th>
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2022-2023 General Announcements PDF Generated 11/23/22
ENGI 501  WORKPLACE COMMUNICATION FOR PROFESSIONAL MASTER’S STUDENTS IN ENGINEERING
ENGI 510  TECHNICAL AND MANAGERIAL COMMUNICATIONS
ENGI 555  ENGINEERING PERSUASION: HOW TO DRIVE DECISIONS AND CHANGE
RCEL 542  PROFESSIONAL COMMUNICATION FOR ENGINEERING LEADERS

**Engineering Software Development Requirement**
Select 2 courses from the following: 6-8
- COMP 504  GRADUATE OBJECT-ORIENTED PROGRAMMING AND DESIGN
- COMP 533  INTRODUCTION TO DATABASE SYSTEMS
- COMP 534  PARALLEL COMPUTING
- COMP 539  SOFTWARE ENGINEERING METHODOLOGY
- COMP 553  BIG DATA MANAGEMENT FOR DATA SCIENCE
- COMP 614  COMPUTER PROGRAMMING FOR DATA SCIENCE
- ELEC 512 / COMP 582  GRADUATE DESIGN AND ANALYSIS OF ALGORITHMS
- ELEC 546 / COMP 546  INTRODUCTION TO COMPUTER VISION
- ELEC 550 / COMP 550 / MECH 550  ALGORITHMIC ROBOTICS
- ELEC 552 / COMP 521  OPERATING SYSTEMS AND CONCURRENT PROGRAMMING
- STAT 605  R FOR DATA SCIENCE
- STAT 606  SAS STATISTICAL PROGRAMMING

**Area of Specialization**
Select 1 of the following Areas of Specialization (see Areas of Specialization below):
- Computer Engineering
- Computer Vision
- Data Science
- Neuroengineering
- Quantum Engineering
- Wireless Systems

**Elective Requirements**
Free Elective Requirement: select 2 additional courses as free electives 1

**Professional Master’s Seminar**
ELEC 698  ECE PROFESSIONAL MASTERS SEMINAR SERIES 2

**Total Credit Hours**
30-34

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**Footnotes and Additional Information**
1 The Free Elective Requirement may be fulfilled by any 2 courses (6 credit hours) selected from the following:
   - Departmental (ELEC) course offerings taught by ECE faculty.
   - Research coursework, such as ELEC 590 or ELEC 591, when either are taken for at least 3 credit hours.
   - Any of the following courses: ENGI 528/CEVE 528, ENGI 529/CEVE 529, ENGI 610/NSCI 610, ENGI 615, or NSCI 511.
   - Any other course approved by the student’s MECE academic advisor.

2 ELEC 698 is taken for a Satisfactory/Unsatisfactory grade and must be completed with a Satisfactory grade. As a S/U course it does not apply to the requirement of a minimum grade of C (2.00 grade points) in each required course.

**Areas of Specialization**
Students must complete a minimum of 2 courses (6 credit hours) from one Area of Specialization.

**Area of Specialization: Computer Engineering**

**Code** | **Title** | **Credit Hours**
--- | --- | ---
ELEC 515  | MACHINE LEARNING FOR RESOURCE-CONSTRAINED PLATFORMS | 6
ELEC 516  | ANALOG INTEGRATED CIRCUITS |
ELEC 517  | MICROWAVE ENGINEERING |
ELEC 521  | ADVANCED DIGITAL INTEGRATED CIRCUITS DESIGN |
ELEC 522  | ADVANCED VLSI DESIGN |
ELEC 523  | INTRODUCTION TO MICROFABRICATION |
ELEC 526 / COMP 526  | HIGH PERFORMANCE COMPUTER ARCHITECTURE |
ELEC 527  | VLSI SYSTEMS DESIGN |
ELEC 542  | NEURAL METHODS FOR IMAGE SYNTHESIS |
ELEC 554 / COMP 554  | COMPUTER SYSTEMS ARCHITECTURE |
ELEC 574  | UBIQUITOUS AND WEARABLE COMPUTING |

**Total Credit Hours**
6

**Area of Specialization: Computer Vision**

**Code** | **Title** | **Credit Hours**
--- | --- | ---
ELEC 502 / COMP 502 / STAT 502  | NEURAL MACHINE LEARNING I |
ELEC 531  | STATISTICAL SIGNAL PROCESSING |
ELEC 533 / CAAM 583 / STAT 583  | INTRODUCTION TO RANDOM PROCESSES AND APPLICATIONS |
ELEC 542  | NEURAL METHODS FOR IMAGE SYNTHESIS |

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<tr>
<td>ELEC 546 / COMP 546</td>
<td>INTRODUCTION TO COMPUTER VISION</td>
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<tr>
<td>ELEC 547</td>
<td>COMPUTER VISION</td>
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<tr>
<td>ELEC 549</td>
<td>COMPUTATIONAL PHOTOGRAPHY</td>
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<tr>
<td>ELEC 553</td>
<td>MOBILE AND EMBEDDED SYSTEM DESIGN AND APPLICATION</td>
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<tr>
<td>ELEC 558</td>
<td>DIGITAL SIGNAL PROCESSING</td>
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<tr>
<td>ELEC 575</td>
<td>LEARNING FROM SENSOR DATA</td>
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<tr>
<td>ELEC 576 / COMP 576</td>
<td>A PRACTICAL INTRODUCTION TO DEEP MACHINE LEARNING</td>
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<tr>
<td>ELEC 578</td>
<td>INTRODUCTION TO MACHINE LEARNING</td>
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<tr>
<td>ELEC 631</td>
<td>ADVANCED MACHINE LEARNING</td>
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**Area of Specialization: Data Science**

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<tr>
<td>ELEC 502 / COMP 502 / STAT 502</td>
<td>NEURAL MACHINE LEARNING I</td>
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<tr>
<td>ELEC 506</td>
<td>LINEAR ALGEBRA FOR DATA SCIENCE</td>
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<tr>
<td>ELEC 515</td>
<td>MACHINE LEARNING FOR RESOURCE-CONSTRAINED PLATFORMS</td>
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<tr>
<td>ELEC 519</td>
<td>DATA SCIENCE AND DYNAMICAL SYSTEMS</td>
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<tr>
<td>ELEC 531</td>
<td>STATISTICAL SIGNAL PROCESSING</td>
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<tr>
<td>ELEC 533 / CAAM 583 / STAT 583</td>
<td>INTRODUCTION TO RANDOM PROCESSES AND APPLICATIONS</td>
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<tr>
<td>ELEC 535</td>
<td>INFORMATION THEORY</td>
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<td>ELEC 546 / COMP 546</td>
<td>INTRODUCTION TO COMPUTER VISION</td>
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**Total Credit Hours** 6

**Area of Specialization: Quantum Engineering**

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<tbody>
<tr>
<td>ELEC 517</td>
<td>MICROWAVE ENGINEERING</td>
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<tr>
<td>ELEC 523</td>
<td>INTRODUCTION TO MICROFABRICATION</td>
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<tr>
<td>ELEC 560</td>
<td>PHYSICS OF SENSOR MATERIALS AND NANOSENSOR TECHNOLOGY</td>
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<tr>
<td>ELEC 562</td>
<td>OPTOELECTRONIC DEVICES</td>
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<tr>
<td>ELEC 563 / PHYS 563</td>
<td>INTRODUCTION TO SOLID STATE PHYSICS I</td>
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<td>ELEC 566</td>
<td>NANOPHOTONICS AND METAMATERIALS</td>
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<td>ELEC 567</td>
<td>NANO-OPTICS</td>
<td></td>
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<tr>
<td>ELEC 569 / PHYS 569</td>
<td>ULTRAFAST OPTICAL PHENOMENA</td>
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<tr>
<td>ELEC 571</td>
<td>IMAGING AT THE NANOSCALE</td>
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<tr>
<td>ELEC 572</td>
<td>FINITE ELEMENT METHOD FOR MULTIPHYSICS MODELING</td>
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<tr>
<td>ELEC 605 / PHYS 605</td>
<td>COMPUTATIONAL ELECTRODYNAMICS</td>
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<tr>
<td>ELEC 660</td>
<td>QUANTUM INFORMATION SCIENCE AND TECHNOLOGY</td>
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**Total Credit Hours** 6

**Area of Specialization: Wireless Systems**

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<tr>
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<tbody>
<tr>
<td>ELEC 502 / COMP 502 / STAT 502</td>
<td>NEURAL MACHINE LEARNING I</td>
<td>6</td>
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<tr>
<td>ELEC 523</td>
<td>INTRODUCTION TO MICROFABRICATION</td>
<td></td>
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<tr>
<td>ELEC 533 / CAAM 583 / STAT 583</td>
<td>INTRODUCTION TO RANDOM PROCESSES AND APPLICATIONS</td>
<td></td>
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<tr>
<td>ELEC 535</td>
<td>INFORMATION THEORY</td>
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<tr>
<td>ELEC 536</td>
<td>ARCHITECTURE FOR WIRELESS COMMUNICATIONS</td>
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<tr>
<td>ELEC 537 / MECH 537</td>
<td>COMMUNICATION NETWORKS</td>
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<td>ELEC 539</td>
<td>INTRODUCTION TO COMMUNICATION NETWORKS</td>
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<tr>
<td>ELEC 551</td>
<td>MODERN COMMUNICATION THEORY AND PRACTICE</td>
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**Total Credit Hours** 6
Policies for the MECE Degree

Department of Electrical and Computer Engineering Graduate Program Handbook

The General Announcements (GA) is the official Rice curriculum. As an additional resource for students, the department of Electrical and Computer Engineering publishes a graduate program handbook, which can be found here: [https://gradhandbooks.rice.edu/2022_23/Electrical_Computer_Engineering_Graduate_Handbook.pdf](https://gradhandbooks.rice.edu/2022_23/Electrical_Computer_Engineering_Graduate_Handbook.pdf)

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.

Departmental Transfer Credit Guidelines

Students pursuing the MECE degree should be aware of the following departmental transfer credit guidelines:

- No more than 1 course (3 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 (and/or the program's official transfer credit advisor) on an individual case-by-case basis.

Additional Information

For additional information, please see the Electrical and Computer Engineering website: [https://www.ece.rice.edu/](https://www.ece.rice.edu/)

Opportunities for the MECE 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).

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

Additional Information

For additional information, please see the Electrical and Computer Engineering website: [https://www.ece.rice.edu/](https://www.ece.rice.edu/)