# BACHELOR OF SCIENCE IN ELECTRICAL AND COMPUTER ENGINEERING (BSECE) DEGREE

The program leading to the BS in Electrical Engineering is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and the Electrical, Computer, Communications, Telecommunication(s) and Similarly Named Engineering Program Criteria.

*The BSEE was renamed the BSECE degree in academic year 2022-2023.*

## Program Learning Outcomes (Student Outcomes) for the BSECE Degree

Upon completing the BSECE degree, students will be able to demonstrate:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

## Program Educational Objectives for the BSECE Degree

The Bachelor of Science in Electrical and Computer Engineering's (BSECE) degree program strives to provide a high quality degree that emphasizes fundamental principles, responds to the changing demands and opportunities of technology, challenges the exceptional abilities of Rice students, and prepares these students for roles of leadership in their chosen careers. In support of this goal, the Bachelor of Science in Electrical and Computer Engineering's (BSECE) degree Program Educational Objectives (PEOs) are to produce graduates who:

1. Practice electrical and computer engineering, and related fields, and/or obtain an advanced degree in electrical and computer engineering, and related fields.
2. Practice mathematical modeling and problem solving skills in electrical and computer engineering and other technical applications.
3. Analyze, incorporate, and adapt to new technical and scientific developments.
4. Assume increasing professional responsibility and enhance communication and teamwork abilities.

## Requirements for the BSECE Degree

For general university requirements, see Graduation Requirements (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/). Students pursuing the BSECE degree must complete:

- A minimum of 28-30 courses (82-83 credit hours), depending on course selection, to satisfy major requirements.
- A minimum of 125 credit hours to satisfy degree requirements.
- A minimum of 13 courses (39 credit hours) taken at the 300-level or above.
- The requirements for one area of specialization (see below for areas of specialization). When students declare the major (https://ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/#text) in Electrical and Computer Engineering (associated with the BSECE degree), students must additionally identify and declare one of four areas of specialization, either in:
  - Computer Engineering (p. 3): provides a broad background in computer systems engineering, including computer architecture, digital hardware engineering, software engineering, and computer systems performance analysis*, or*
  - Data Science/Systems (p. 4): integrates the foundations, tools and techniques involving data acquisition, data analytics, data storage and computing infrastructure in order to enable meaningful extraction of actionable information from diverse and potentially massive data sources. Applications include wireless communication systems, digital signal processing, image processing, and networking, *or*
  - Neuroengineering (p. 4): exploits engineering techniques to understand, repair, manipulate, or treat the diseases of human neural systems and networks, *or*
  - Photonics, Electronics, and Nano-devices (p. 4): encompasses studies of electronic materials, including nanomaterials, semiconductor and optoelectronic devices, lasers and their applications.

Because of the common core requirements, it is possible for students to change their area of specialization at any time, even after initially declaring the major. To do so, please contact the Office of the Registrar (registrar@rice.edu).

The specialization electives provide the flexibility to create a focus that crosses traditional areas. Ultimately each student's program must contain a course sequence that provides depth in one area and courses from at least two areas to provide breadth. Because of the number of options, students should consult early with departmental advisors to plan a program that meets their needs. Planning sheets and degree plan forms can be found on the Electrical and Computer Engineering (http://www.ece.rice.edu/) website.

The BSECE degree is the usual degree taken by those students planning a career in engineering practice. The BSECE requires more hours and greater depth than the BA degree; however, it still provides considerable flexibility and can reduce the time required to become a licensed

professional engineer. In the final year, BSECE students undertake a capstone design project.

Students considering a major offered by the Electrical and Computer Engineering department should take physics (PHYS 101, PHYS 102) and calculus (MATH 101 or MATH 105, MATH 102 or MATH 106) in their first year, along with COMP 140. The first core courses in the department, ELEC 220, ELEC 241 (lecture) with ELEC 240 (lab), and ELEC 261 are usually taken during the second year, along with more math and science. A course can satisfy only one program requirement. Students entering with advanced placement may have more scheduling options and may take some of these core courses in their first year. Students who place out of required courses without transcript credit must substitute other approved courses in the same area. Students should consult with one of the department's undergraduate advisors in these situations.

The courses listed below satisfy the requirements for this major. In certain instances, courses not on this official list may be substituted upon approval of the major's academic advisor, or where applicable, the department's Director of Undergraduate Studies. (Course substitutions must be formally applied and entered into Degree Works by the major's Official Certifier (https://registrar.rice.edu/facstaff/degreeworks/officialcertifier/).) 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 Major in Electrical and Computer Engineering | | 82-83 |
| Total Credit Hours Required for the BSECE Degree | | 125 |

## Degree Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Core Requirements** | | |
| Mathematics and Science Courses | | |
| ELEC 261 | INTRODUCTION TO PHYSICAL ELECTRONICS I | 3 |
| ELEC 263 | INTRODUCTION TO PHYSICAL ELECTRONICS LAB | 1 |
| ELEC 303 | RANDOM SIGNALS IN ELECTRICAL ENGINEERING SYSTEMS | 3 |
| MATH 101 | SINGLE VARIABLE CALCULUS I | 3 |
| or MATH 105 | AP/OTH CREDIT IN CALCULUS I | |
| MATH 102 | SINGLE VARIABLE CALCULUS II | 3 |
| or MATH 106 | AP/OTH CREDIT IN CALCULUS II | |
| MATH 212 | MULTIVARIABLE CALCULUS | 3 |
| or MATH 221 | HONORS CALCULUS III | |
| or MATH 232 | HONORS MULTIVARIABLE CALCULUS | |
| *Select 1 course from the following:* | | 3 |
| CMOR 302 | MATRIX ANALYSIS | |
| CMOR 303 | MATRIX ANALYSIS FOR DATA SCIENCE | |
| MATH 355 | LINEAR ALGEBRA | |
| MATH 354 | HONORS LINEAR ALGEBRA | |
| *Select 1 from the following:* | | 4 |
| PHYS 101 & PHYS 103 | MECHANICS (WITH LAB) and MECHANICS DISCUSSION [1] | |
| PHYS 111 | HONORS MECHANICS (WITH LAB) [1] | |
| *Select 1 from the following:* | | 4 |
| PHYS 102 & PHYS 104 | ELECTRICITY & MAGNETISM (WITH LAB) and ELECTRICITY AND MAGNETISM DISCUSSION [1] | |
| PHYS 112 | HONORS ELECTRICITY & MAGNETISM (WITH LAB) [1] | |
| Approved Electives in Mathematics and Science | | |
| *Select 3-4 credit hours from the following typically approved courses:* | | 3-4 |
| BIOS 201 | INTRODUCTORY BIOLOGY I | |
| CMOR 304 | DIFFERENTIAL EQUATIONS IN SCIENCE AND ENGINEERING | |
| CMOR 360 | INTRODUCTION TO OPERATIONS RESEARCH AND OPTIMIZATION | |
| CHEM 121 | GENERAL CHEMISTRY I | |
| or CHEM 111 | AP/OTH CREDIT IN GENERAL CHEMISTRY I | |
| CHEM 122 | GENERAL CHEMISTRY II | |
| or CHEM 112 | AP/OTH CREDIT IN GENERAL CHEMISTRY II | |
| CHEM 123 | GENERAL CHEMISTRY LABORATORY I | |
| or CHEM 113 | AP/OTH CREDIT IN GENERAL CHEMISTRY LAB I | |
| CHEM 124 | GENERAL CHEMISTRY LABORATORY II | |
| or CHEM 114 | AP/OTH CREDIT IN GENERAL CHEMISTRY LAB II | |
| MATH 211 | ORDINARY DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA | |
| MATH 220 | HONORS ORDINARY DIFFERENTIAL EQUATIONS | |
| MATH 222 | HONORS CALCULUS IV | |
| Electrical and Computer Engineering (ECE) Core Courses: | | |
| ELEC 220 | FUNDAMENTALS OF COMPUTER ENGINEERING | 4 |
| ELEC 241 & ELEC 240 | FUNDAMENTALS OF ELECTRICAL ENGINEERING I and FUNDAMENTALS OF ELECTRICAL ENGINEERING I LABORATORY | 4 |
| ELEC 242 & ELEC 244 | SIGNALS, SYSTEMS, AND TRANSFORMS and ANALOG CIRCUITS LABORATORY | 4 |
| ELEC 305 | INTRODUCTION TO PHYSICAL ELECTRONICS II | 3 |
| ELEC 326 / COMP 326 | DIGITAL LOGIC DESIGN | 3 |
| ELEC 378 | MACHINE LEARNING: CONCEPTS AND TECHNIQUES | 3 |
| Computation Course | | |
| COMP 140 | COMPUTATIONAL THINKING | 4 |
| **Design Requirements** [2] | | |
| Design Laboratory [3] | | |
| ELEC 327 | IMPLEMENTATION OF DIGITAL SYSTEMS | 3 |
| or ELEC 364 | PHOTONICS MEASUREMENTS: PRINCIPLES AND PRACTICE | |
| Design [4] | | |
| ELEC 494 | SENIOR DESIGN (2 semesters required, 1st semester) | 3 |
| ELEC 494 | SENIOR DESIGN (2 semesters required, 2nd semester) | 3 |

**Area of Specialization**

| | |
|---|---|
| *Select 1 from the following Areas of Specialization (see Areas of Specialization below):* | 18 |
| Computer Engineering | |
| Data Science / Systems | |
| Neuroengineering | |
| Photonics, Electronics, and Nano-devices | |
| **Total Credit Hours Required for the Major in Electrical and Computer Engineering** | **82-83** |
| Additional Credit Hours to Complete Degree Requirements [*] | 11-12 |
| University Graduation Requirements (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/) [*] | 31 |
| **Total Credit Hours** | **125** |

## Footnotes and Additional Information

[*]   **Note:** University Graduation Requirements include 31 credit hours, comprised of Distribution Requirements (Groups I, II, and III), FWIS, and LPAP coursework. In some instances, courses satisfying FWIS or distribution requirements may additionally meet other requirements, such as the Analyzing Diversity (AD) requirement, or some of the student's declared major, minor, or certificate requirements. Additional Credit Hours to Complete Degree Requirements include general electives, coursework completed as upper-level, residency (hours taken at Rice), and/or any other additional academic program requirements.

[1]   The Electrical and Computer Engineering department has determined that credit awarded for PHYS 141 *CONCEPTS IN PHYSICS I* and credit awarded for PHYS 142 *CONCEPTS IN PHYSICS II* are not eligible for meeting the requirements of the Electrical and Computer Engineering major.

[2]   The design requirements (Design Laboratory and Senior Design) are typically taken during the junior and senior years.

[3]   Design Laboratory is typically taken in the junior year. The required Design Laboratory does not count as a specialization course. It is important to consult a departmental advisor when choosing the Design Laboratory course or if interested in taking a second one. Any Design Laboratory course taken above the one required course will count as a General Elective, not as a specialization course.

[4]   Students must complete the ELEC 494 during both the fall and spring semesters of their senior year. Within the senior design sequence, professional issues and project management for electrical engineers provide instruction in professional engineering topics and the nontechnical aspects of the design process, including ethics, design methodology, project planning, technical presentations, and documentation. Both semesters of the senior year are devoted to the team design project using the resources of the Oshman Engineering Design Kitchen (OEDK) through the ELEC 494 course. In the fall semester of the senior year, students finalize their project topics in coordination with the faculty and begin the design project. In the spring semester, students continue in the laboratory to complete their design project. Several presentations and design contests within the ECE department and the School of Engineering occur in the spring in which to showcase the projects.

## Areas of Specialization

Students must complete the requirements as listed for one of the following areas of specialization as offered by the BSECE degree program. A total of 6 courses (minimum of 18 credit hours) must be taken from at least two areas of specialization, including a minimum of 3 courses from one area of specialization, 1 course from an area of specialization **outside** of the student's chosen specialization, and 2 courses from **any** area of specialization. In addition, ELEC graduate coursework at the 500-level may be used to satisfy specialization area requirements with permission. Consult departmental advisors and the Electrical and Computer Engineering (https://www.ece.rice.edu/) website for the latest information.

### Area of Specialization: Computer Engineering

To fulfill the remaining BSECE degree requirements, students pursuing the Computer Engineering area of specialization must complete:

- a minimum of 3 courses (9 credit hours) from the Computer Engineering area of specialization
- 1 course (3 credit hours) from any area of specialization **outside** Computer Engineering (from Data Science/Systems, Neuroengineering, or Photonics, Electronics, and Nano-devices)
- 2 courses (6 credit hours) from **any** area of specialization (including Computer Engineering)

| Code | Title | Credit Hours |
|---|---|---|
| *Select a minimum of 3 courses from the following:* [1] | | *9* |
| COMP 321 | INTRODUCTION TO COMPUTER SYSTEMS | |
| COMP 382 | REASONING ABOUT ALGORITHMS | |
| COMP 430 | INTRODUCTION TO DATABASE SYSTEMS | |
| ELEC 323 / COMP 322 | PRINCIPLES OF PARALLEL PROGRAMMING | |
| ELEC 410 / COMP 436 | SECURE AND CLOUD COMPUTING | |
| ELEC 411 | MICROWAVE ENGINEERING | |
| ELEC 414 | WIRELESS INTEGRATED CIRCUITS AND SYSTEMS | |
| ELEC 421 / COMP 421 | OPERATING SYSTEMS AND CONCURRENT PROGRAMMING | |
| ELEC 422 | VLSI SYSTEMS DESIGN | |
| ELEC 423 | DIGITAL INTEGRATED CIRCUITS | |
| ELEC 424 / COMP 424 | MOBILE AND EMBEDDED SYSTEM DESIGN AND APPLICATION | |
| ELEC 425 / COMP 425 | COMPUTER SYSTEMS ARCHITECTURE | |
| ELEC 426 | ADVANCED DIGITAL INTEGRATED CIRCUITS DESIGN | |
| ELEC 429 / COMP 429 | INTRODUCTION TO COMPUTER NETWORKS | |
| ELEC 434 | ADVANCED HIGH-SPEED SYSTEM DESIGN | |
| ELEC 437 | INTRODUCTION TO COMMUNICATION NETWORKS | |
| ELEC 442 | INTRODUCTION TO ANALOG INTEGRATED CIRCUITS | |
| ELEC 450 / COMP 450 / MECH 450 | ALGORITHMIC ROBOTICS | |
| *Select 1 course from any Area of Specialization outside Computer Engineering (from Data Science/Systems, Neuroengineering, or Photonics, Electronics, and Nano-devices)* | | *3* |

| | | |
|---|---|---|
| *Select 2 courses from any Area of Specialization (including Computer Engineering)* | | *6* |
| **Total Credit Hours** | | **18** |

## Footnotes and Additional Information

[1] The sequence of COMP 140, COMP 182, and COMP 215 is recommended in addition for the Computer Engineering area of specialization as these courses are prerequisites for many of the Computer Science courses.

## Area of Specialization: Data Science/Systems

To fulfill the remaining BSECE degree requirements, students pursuing the Data Science/Systems area of specialization must complete:

- a minimum of 3 courses (9 credit hours) from the Data Science/Systems area of specialization
- 1 course (3 credit hours) from any area of specialization *outside* Data Science/Systems (from Computer Engineering, Neuroengineering, or Photonics, Electronics, and Nano-devices)
- 2 courses (6 credit hours) from *any* area of specialization (including Data Science/Systems)

| Code | Title | Credit Hours |
|---|---|---|
| *Select a minimum of 3 courses from the following:* | | *9* |
| COMP 330 | TOOLS AND MODELS FOR DATA SCIENCE | |
| DSCI 302 | INTRODUCTION TO DATA SCIENCE TOOLS AND MODELS | |
| ELEC 406 | LINEAR ALGEBRA FOR DATA SCIENCE | |
| ELEC 430 | MODERN COMMUNICATION THEORY AND PRACTICE | |
| ELEC 431 | DIGITAL SIGNAL PROCESSING | |
| ELEC 432 | MOBILE BIO-BEHAVIORAL SENSING | |
| ELEC 434 | ADVANCED HIGH-SPEED SYSTEM DESIGN | |
| ELEC 436 / MECH 420 | FUNDAMENTALS OF CONTROL SYSTEMS | |
| ELEC 437 | INTRODUCTION TO COMMUNICATION NETWORKS | |
| ELEC 439 | DATA SCIENCE AND DYNAMICAL SYSTEMS | |
| ELEC 440 / COMP 440 | ARTIFICIAL INTELLIGENCE | |
| ELEC 441 | COMPUTATIONAL IMAGING | |
| ELEC 445 | INTRODUCTION TO DIGITAL IMAGE AND VIDEO PROCESSING | |
| ELEC 447 / COMP 447 | INTRODUCTION TO COMPUTER VISION | |
| ELEC 448 | 3D VISION: FROM AUTONOMOUS CARS TO THE METAVERSE | |
| ELEC 475 | LEARNING FROM SENSOR DATA | |
| ELEC 478 | INTRODUCTION TO MACHINE LEARNING | |
| ELEC 498 / COMP 498 / MECH 498 | INTRODUCTION TO ROBOTICS | |
| MECH 488 | DESIGN OF MECHATRONIC SYSTEMS | |
| STAT 413 | INTRODUCTION TO STATISTICAL MACHINE LEARNING | |

| | | |
|---|---|---|
| *Select 1 course from any Area of Specialization outside Data Science/Systems (from Computer Engineering, Neuroengineering, or Photonics, Electronics, and Nano-devices)* | | *3* |
| *Select 2 courses from any Area of Specialization (including Data Science/Systems)* | | *6* |
| **Total Credit Hours** | | **18** |

## Area of Specialization: Neuroengineering

To fulfill the remaining BSECE degree requirements, students pursuing the Neuroengineering area of specialization must complete:

- a minimum of 3 courses (9 credit hours) from the Neuroengineering area of specialization
- 1 course (3 credit hours) from any area of specialization *outside* Neuroengineering (from Computer Engineering, Data Science/Systems, or Photonics, Electronics, and Nano-devices)
- 2 courses (6 credit hours) from *any* area of specialization (including Neuroengineering)

| Code | Title | Credit Hours |
|---|---|---|
| *Select a minimum of 3 courses from the following:* | | *9* |
| ELEC 380 / BIOE 380 / NEUR 383 | INTRODUCTION TO NEUROENGINEERING: MEASURING AND MANIPULATING NEURAL ACTIVITY | |
| ELEC 382 / NEUR 382 | INTRODUCTION TO COMPUTATIONAL NEUROSCIENCE | |
| ELEC 483 | MACHINE LEARNING AND SIGNAL PROCESSING FOR NEURO ENGINEERING | |
| ELEC 485 / BIOE 485 / COMP 485 | FUNDAMENTALS OF MEDICAL IMAGING I | |
| ELEC 486 / BIOE 486 / COMP 486 | FUNDAMENTALS OF MEDICAL IMAGING II | |
| ELEC 487 | IMAGING OPTICS | |
| ELEC 488 / CAAM 415 / NEUR 415 | THEORETICAL NEUROSCIENCE: FROM CELLS TO LEARNING SYSTEMS | |
| ELEC 489 / CAAM 416 / NEUR 416 | NEURAL COMPUTATION | |
| *Select 1 course from any Area of Specialization outside Neuroengineering (from Computer Engineering, Data Science/Systems, or Photonics, Electronics, and Nano-devices)* | | *3* |
| *Select 2 courses from any Area of Specialization (including Neuroengineering)* | | *6* |
| **Total Credit Hours** | | **18** |

## Area of Specialization: Photonics, Electronics, and Nano-devices

To fulfill the remaining BSECE degree requirements, students pursuing the Photonics, Electronics, and Nano-devices area of specialization must complete:

- a minimum of 3 courses (9 credit hours) from the Photonics, Electronics, and Nano-devices area of specialization
- 1 course (3 credit hours) from any area of specialization *outside* Photonics, Electronics, and Nano-devices (from Computer Engineering, Data Science/Systems, or Neuroengineering)

- 2 courses (6 credit hours) from *any* area of specialization (including Photonics, Electronics, and Nano-devices)

| Code | Title | Credit Hours |
| --- | --- | --- |
| *Select a minimum of 3 courses from the following:* | | *9* |
| ELEC 262 | INTRODUCTION TO WAVES AND PHOTONICS | |
| ELEC 361 | QUANTUM MECHANICS FOR ENGINEERS | |
| or PHYS 311 | INTRODUCTION TO QUANTUM PHYSICS I | |
| ELEC 460 | PHYSICS OF SENSOR MATERIALS AND NANOSENSOR TECHNOLOGY | |
| ELEC 461 | QUANTUM MECHANICS AND REAL-WORLD APPLICATIONS | |
| or PHYS 412 | SOLID STATE PHYSICS | |
| ELEC 462 | OPTOELECTRONIC DEVICES | |
| ELEC 468 | INTRODUCTION TO QUANTUM COMPUTING WITH QISKIT | |
| PHYS 302 | INTERMEDIATE ELECTRODYNAMICS | |
| PHYS 416 | COMPUTATIONAL PHYSICS | |
| *Select 1 course from any Area of Specialization outside Photonics, Electronics, and Nano-devices (from Computer Engineering, Data Science/Systems, or Neuroengineering)* | | *3* |
| *Select 2 courses from any Area of Specialization (including Photonics, Electronics, and Nano-devices)* | | *6* |
| **Total Credit Hours** | | **18** |

# Policies for the BSECE Degree
## Advising

Rice University provides multiple avenues for undergraduate advising through the Office of Academic Advising, the Rice Residential College system, and academic departments. Although students may consult with their Divisional Advisors in their College during the first and second years, they are welcome and encouraged to meet with a major advisor in the Electrical and Computer Engineering Department. In particular, ECE students are required to meet with a major advisor in ECE at least during their junior and senior years to discuss their ECE Area of Specialization course selection and Design Courses. The ECE Undergraduate Committee currently has five faculty members who serve as major advisors.

## Program Restrictions and Exclusions

Students pursuing the BSECE degree should be aware of the following program restriction:

- As noted in Majors, Minors, and Certificates (https://ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/), under *Declaring Majors, Minors and Certificates*, students may not obtain both a BA and a BS in the same major.
- Students pursuing the Bachelor of Science in Electrical and Computer Engineering (BSECE) Degree may not additionally pursue the BA Degree with a Major in Electrical and Computer Engineering.

## Transfer Credit

For Rice University's policy regarding transfer credit, see Transfer Credit (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/transfer-credit/). Some departments and programs have additional restrictions on transfer credit. The Office of Academic Advising maintains the university's official list of transfer credit advisors (https://

oaa.rice.edu/advising-network/transfer-credit-advisors/) on their website: https://oaa.rice.edu. Students are encouraged to meet with their academic program's transfer credit advisor when considering transfer credit possibilities.

## Departmental Transfer Credit Guidelines

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

- 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/.

# Opportunities for the BSECE Degree
## Academic Honors

The university recognizes academic excellence achieved over an undergraduate's academic history at Rice. For information on university honors, please see Latin Honors (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/) (*summa cum laude*, *magna cum laude*, and *cum laude*) and Distinction in Research and Creative Work (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/). Some departments have department-specific Honors awards or designations.

## 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 Electrical and Computer Engineering (MECE) degree. For additional information,

students should contact their undergraduate major advisor and the MECE program director.

## Independent Research

The ECE Department encourages our undergraduates to pursue research projects with the faculty. The ECE Department has several opportunities including the multi-year, team-oriented Vertically Integrated Projects (VIP) program through the ELEC 491 course and individual independent research with a faculty member through the ELEC 490 course. For information on taking an undergraduate summer research course tuition free, see the *Summer Sessions* tab on the Office of the Registrar website (https://registrar.rice.edu/students/summersessions/). Also, there are often summer research opportunities through the NSF funded Research Experience for Undergraduates (REU) program, through individual ECE faculty grants, or through the Smalley-Curl Institute REU Sites program.

## Study Abroad

A semester of study abroad is a valuable experience to enhance an individual's perspective on engineering and technology. The ECE Department encourages students to explore this option particularly for the spring semester of the sophomore or junior year. The ECE Department and the University Study Abroad office coordinate to review programs and courses appropriate for Rice engineering students.

## Additional Information

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