ELECTRICAL ENGINEERING, MS

Electrical Engineering Masters Program

The Electrical Engineering master's program will train highly skilled electrical engineers with expertise in the fundamental and applied aspects of their area of choice. Students in this degree program will focus on gaining theoretical and experimental knowledge while fostering critical thinking and problem-solving abilities in a multidisciplinary context. Graduates will be well-prepared for careers in both academia and industry across nearly all sectors of our modern society. With the global push toward more efficient, sustainable, and innovative solutions, this master's degree program will equip students with the advanced knowledge and practical skills required to lead and contribute to developments in these transformative areas.

The focus areas available in the program are

1. Quantum, Electronics, and Photonics (QEP)

This focus area emphasizes quantum, electronic, and photonic fundamentals and technologies. There is currently a strong need for more skilled workers in each of these three target areas, and the rapid pace of technological advancement in these industries necessitates further education and skill development to stay competitive. Emerging technologies such as quantum computing, semiconductor devices, and photonic integrated circuits are reshaping industries and opening new frontiers in applying physics principles to benefit humanity. The QEP thrust provides a comprehensive understanding of quantum mechanics, the design and operation of electronic devices, and the principles of photonics—all of which are critical for the future of technology in communication, computing, energy systems, defense, and healthcare.

2. Signals and Computing Systems (SCS)

This focus area sits at the intersection of computing, signals and information processing, controls, networking, communications, and the hardware/software interface. The SCS thrust has a strong dependence on optimization, machine learning, and artificial intelligence. This focus area interfaces with nearly all areas of technology development and is an area of ongoing growth and demand for trained engineers.

Upon completion of this program, graduates will be able to:

1. **Describe Fundamental Principles**: For QEP, students will grasp the fundamental principles of quantum mechanics, solid state physics, and electromagnetism and their relevance to modern electrical engineering. For SCS, students will hone mathematical, analytical, and coding knowledge in the context of technology domains influenced by electrical engineering.
2. **Design Devices and Systems**: Students will design, with quantitative modeling, electronic and optoelectronic devices, computing systems, integrated circuits, controllers, and other EE platforms that require use of the full engineering design process.
3. **Conduct Independent Research and Learning**: Students in the program will utilize lifelong learning skills in coursework to conduct research into cutting edge technologies, demonstrated by communicating them to their peers. Students in the thesis track will conduct research in one or more of the program's focus areas, contributing original ideas to the field.
4. **Work in Multidisciplinary Teams**: Students will collaborate effectively in diverse teams, bringing expertise from their previous background and ongoing experience to solve complex engineering challenges, whether in course-based projects, hands-on labs, research groups, or other components of the program.

Career Opportunities

Graduates of this program will be prepared for leadership roles in a variety of industries including:

- Quantum computing and quantum communication companies
- Semiconductor manufacturing and R&D
- Optoelectronics and photonic systems companies
- Energy and materials-oriented industries
- Healthcare device and systems industries
- Defense and intelligence industries
- Space technology companies
- Telecommunication and networking companies
- Companies that utilize extensive data streams for optimization and decision-making
- Companies employing advanced controls systems (vehicles, aerospace, robotics, etc.)
- Research institutions and universities
- And many other fields impacted by electrical engineering

Requirements

Required Coursework

Applicants may choose one of two paths: 30 credits of coursework from the approved curriculum OR 24 credits of coursework and a 6-credit written research thesis supervised by a Tulane SSE faculty member. The thesis must be based on original research and must be approved by a committee consisting of at least three members, including the research supervisor and at least one other full-time member of the SSE faculty. One member may be from another Tulane school or other appropriate outside institution. Approval of the research topic and committee from the Electrical Engineering Graduate Advisor and consent from all committee members are required before embarking on the thesis.

Coursework for the Tulane EE Master's degree may be selected from any of the following. Students must complete a degree plan listing all proposed courses, either selecting one of the below focus areas or creating a custom plan, to be reviewed and approved by the Electrical Engineering Graduate Advisor before the first day of classes at the start of the program.

Course ID	Title	Credits
Quantum, Electronics, and Photonics Focus Area		
It is recommended to take at least 4 courses from the following list:		
PHYS 7170	Quantum Mechanics I	3
PHYS 7130	Solid State Physics	3
PHYS 6600	Nanoscience & Technology	3
MPEN 6570	Semiconductor Devices	3
MPEN 6560	Photonic Materials & Devices	3
PHYS 6230	Quantum Information Sci & Eng	3
PHYS 6310	Quantum Optics	3
Additional courses may be selected from the following list or from the list above:		
PHYS 6700	Electrnc Prop of Materls	3
BMEN 6170	Biomedical Optics	3
BMEN 6840	Medical Imaging Physics	3
BMEN 6970	TRIZ - Theory of Inventive Design	3
MPEN 6620	MicroFab and Nanotech	3
MPEN 6390	Synthesis of Nanomaterials	3
PHYS 6710	Introduction to Quantum Field Theory	3
PHYS 7160	Atomic/Molecular Physics	3
MPEN 6290	Computation Material Sci & Eng	3
PHYS 7230	Electromagnetic Theory I	3
PHYS 7240	Electro-Magnetic Thry II	3
PHYS 6170	Computnl Physics & Engr	3
MPEN 6380	Materials for Energy	3
CENG 6140	Electrochemistry	3
Signals and Computing Systems Focus Area		
It is recommended to take at least 2 courses from this list of core topics:		
PHYS 6180	Introduction to Feedback Control and Control Theory	3
BMEN 6730	Biomedical Signals and Systems	3
CMPS 6280	Information Theory	3
CMPS 6510	Computer Organization	3
Additional courses may be selected from the following list or from the list above:		
PHYS 6170	Computnl Physics & Engr	3
PHYS 6230	Quantum Information Sci & Eng	3
MPEN 6290	Computation Material Sci & Eng	3
BMEN 6800	BME Data Science: Medical Imaging/Machine Learning	3
BMEN 6840	Medical Imaging Physics	3
BMEN 6970	TRIZ - Theory of Inventive Design	3
CENG 6680	Data Science and Machine Learning for Scientific Research	3
CMPS 6620	Artificial Intelligence	3

CMPS 6720	Machine Learning	3
CMPS 6750	Computer Networks	3
CMPS 6770	Operating Systems	3
CMPS 6780	Computer Architecture	3
CMPS 6790	Data Science	3
CMPS 6830	Computer Vision	3

Commercialization and Policy Course Option: With approval of the EE MS Advisor, students interested in technology entrepreneurship, commercialization, and policy may complete one of the following courses, or another similar course, to fulfill up to 3 credits towards the EE MS degree,

Course ID	Title	Credits
Commercialization and Policy Courses		
MGMT 6160	New Venture Planning	3
MGMT 7210	Management of Technology and Innovation	3
SCEN 6000	Entrepreneurship Eng & Biosci	3
BMEN 6080	Tech Invent &Commercialization	3
ENRG 7100	Energy Markets, Institutions & Policy	3
ENRG 7120	Energy Data Analysis	3
ENRG 7610	Energy Trading: Wholesale Electric Markets	3

Math Option: Students may be interested in acquiring or enhancing mathematics skills by enrolling in courses offered by the Mathematics Department. With approval of the EE MS Advisor, EE MS students may take up to 3 credits of graduate level MATH courses at Tulane, as a substitution for one of their EE MS courses.

Other current and future graduate-level SSE courses, including ones designated as BMEN, CENG, CHEM, CMPS, ELEN, MCEN, MPEN, NSCI, and PHYS, may be suitable electives for EE Master's students, with approval from the EE MS Advisory Committee.

Admission

No undergraduate major is specified for admission. Applicants must have completed at least 24 credit hours in science and engineering (3.0 GPA or higher). Adequate background coursework in mathematics, physical science, computer science, and core aspects of electrical engineering is required. For example, for students interested in the QEP focus area, courses in modern physics, optics, or electromagnetic theory are appropriate, along with at least four semesters of math and at least one undergraduate electrical engineering course (such as circuits or electronics). For the SCS focus area, courses demonstrating programming proficiency are required, in areas such as algorithms and systems, along with at least four semesters of math (discrete math preferred) and one electrical engineering course (such as digital logic or signals & systems). Provisional admission with required remedial coursework is possible. Students who have not taken the requisite introductory course work will be allowed to take such courses at Tulane without credit towards the graduate degree to make up for this deficiency. Applicants may also demonstrate proficiency in the introductory material by passing the Fundamentals of Engineering (FE) exam in electrical and computer engineering. Students must submit a transcript, a personal statement (which should include a statement about which EE area they would like to focus on), at least one letter of recommendation, and proof of proficiency in English (undergraduate degree from a program in which English was the language of instruction, or TOEFL, IELTS, or equivalent standardized score).

For more information, go to our admissions page here: https://sse.tulane.edu/academics/graduate/admissions (https://sse.tulane.edu/academics/graduate/admissions/)

Tuition

For Tuition Rates » (https://studentaccounts.tulane.edu/tuition-and-fees/)

GPA Requirement

A GPA of 3.0 is required for the degree to be conferred. Courses receiving less than B- will contribute no credit toward the Master's degree requirements.

Apply

Please use the Online Application System (https://applygrad.tulane.edu/apply/) to apply for the program. The application deadlines are May 15th for Fall admission and November 15th for Spring admission.

Contacts

Please contact any of the following faculty if you have questions about the program.

- Prof. Matthew Escarra (escarra@tulane.edu)
- Prof. Ryan Gelfand (rgelfand1@tulane.edu)
- Prof. Lu Peng (lpeng3@tulane.edu)

Electrical Engineering (ME) Masters 4+1 Program

In addition to the above requirements:

- Tulane 4+1 students must have a letter of recommendation from a Tulane SSE faculty member.
- 4+1 students will normally indicate their intention to pursue the program before the end of the third year at Tulane and will complete between 6 and 12 credits of coursework towards the MS degree by the end of the fourth year.
- Six of these credits can count simultaneously towards the 120 credits required for the Bachelor's degree.

Program String and Field of Study: SEMS_GR, ELEN

Catalog addenda note: *This program was added to the catalog on 6/13/2025.*

Contact

For more information, contact the School of Science and Engineering (https://sse.tulane.edu/academics/graduate/masters-programs/).