MASTER OF SCIENCE: ELECTRICAL ENGINEERING

Program Description

The Master of Science in Electrical Engineering (MSEE) at the University of Missouri – Kansas City (UMKC) is a 30 Credit Hours graduate degree program, which is accredited by the Higher Learning Commission (HLC).

The MSEE Degree Program offers different options to help students complete the degree based on their needs and time and financial planning. The MSEE prepares the graduates for a wide range of future opportunities, whether it is corporate research, product development, manufacturing, service sector, the management, or entrepreneurial endeavors. It also prepares graduates for doctoral studies. The overall goal is to put graduates into a position to be leading technology developers and innovators.

Degree Options

- The MSEE Degree Program is open to both full-time and part-time students.
- The MSEE Degree Program admits both domestic and international students. *International students must comply with the US Federal Government's restrictions on the number of online classes*.
- The MSEE Degree Program offers two academic options: Thesis and Non-Thesis (Course) options. In the thesis option, the students have the opportunity to engage in research that builds upon the coursework to investigate the state-of-the-art and emerging challenges and topics in the chosen area.
- **One-Year Expedited MSEE Degree Option:** The MSEE students can select the option to complete the Non-Thesis (Course-Option) degree in one (1) year by taking four (4) courses in Fall, four (4) courses in Spring, and two (2) courses in Summer semester. Few points to consider before selecting the One-Year Expedited MSEE Degree option:
  - This option is suitable for the students who have the backgrounds and prerequisites for the offered courses for the MSEE program in a particular year.
  - Please check with the advisers to ensure that the prerequisite requirements (if any) of the selected classes are satisfied.
  - Students under this option may not get the chance to take all the desired courses from a specific emphasis area in one year. However, at least four (4) courses from each area will be offered every year.
  - Not all of the desired courses may be available online.

MSEE Emphasis Areas at UMKC

The MSEE Degree Program at UMKC has the following **six Emphasis Areas:**

1) Computer, Embedded Systems, and Microelectronics
2) Nanotechnology
3) Electromagnetics and Radio Frequency (RF) Circuits and Systems
4) Communication, Networking, and Signal Processing
5) Computer Vision, Multimedia, and Machine Learning
6) Power, Renewable Energy, and Control

Admission Requirements

Applicants for the MSEE at UMKC should have a GPA of at least 3.0 on the scale of 4.0 in the last 60 semester hours of relevant undergraduate coursework in Electrical and Electronic Engineering, Computer Engineering, and other related engineering programs. However, if the GPA is below 3.0 but more than 2.75, and if other academic indicators promise success in the program, rules may still allow probationary admission. Some students may have to take additional core electrical engineering prerequisite courses if they do not have the necessary background for any specific graduate course or emphasis area. The following documents are required for consideration for admission:

1. Completed application form for graduate (masters) admission.
2. Official transcripts of all college work.
3. Graduate Record Examination (GRE) is **not required**.
4. Two letters of recommendation are needed for applicants with an overall GPA of less than 3.0 in the last 60 hours of their undergraduate degree program.
5. Professional students with work experiences in relevant industries can petition for the waiver of some of the admission requirements.

6. For international applicants, a minimum test score of 79 (TOEFL iBT) or 6.0 (IELTS) is necessary (the older TOEFL and CBT scores are no longer accepted).

    - **TOEFL/IELTS Waiver/Exemption**:
        - International students from English speaking countries like the United Kingdom, Canada, Australia, and New Zealand do not need TOEFL or IELTS.
        - International students from the following Non-English speaking countries: **India, Pakistan, Bangladesh, Egypt, Turkey, South Africa, and Singapore**, where the medium of college education in the STEM disciplines is English, **do not require TOEFL or IELTS**.

Degree Requirements

1. MSEE students at UMKC must complete at least 24 Credit Hours (equivalent to 8 regular courses) from ECE topic areas (ECE designated graduate courses). For some of the emphasis areas, the CSEE designated graduate courses will also be counted towards this 24 Credit Hours requirement. MSEE students can take the remaining 6 Credit Hours (equivalent to 2 regular courses) from any related discipline, including ECE.
2. MSEE degree program has two options:
    a. Course-Option: 10 Courses (8 ECE Courses + 2 courses from any related discipline).
    b. Thesis-Option: 8 Courses (6 ECE Courses + 2 courses from any related discipline) + MS Thesis (6 Credit Hours).
3. Students of the MSEE Degree Program are typically required to take 5000-level graduate classes. However, students can petition to take up to six (6) Credit Hours of 400-level coursework for the MSEE degree.
4. Course Transfers: MSEE students can transfer a maximum of six (6) Credit Hours of graduate-level courses from any other accredited domestic and international institutes according to the rules and regulations set by the School of Graduate Studies (SGS) at UMKC.
5. For the minimum GPA and other requirements (for the domestic and international students) to complete the MSEE Degree, the rules and regulations set by the School of Graduate Studies (SGS) and the International Student Affairs Office (ISAO) will be followed. Students are advised to consult with the advisers and relevant faculty members periodically.

MSEE Degree Emphasis Area Selection Guidelines

1. The students in the MSEE Degree Program **are not required** to select an emphasis area. They will obtain the MSEE diploma if they fulfill the degree requirements listed above.
2. It is strongly recommended to **select at least one emphasis area** to be prepared for a career in that area.
    a. Employers in a particular sector would like to see that a graduate has a series of relevant courses and training in various topics and tools related to that sector.
    b. It is important to acknowledge that current technologies and industries are very specialized. Most of the time, employers ask for specific skills and academic backgrounds for each new position.
    c. Students are recommended to take at least 12 Credit Hours from a selected emphasis area. These 12 Credit Hours can be covered by four (4) courses or two (2) courses and the MS Thesis in the chosen field.
    d. To expand academic training and increase employability, **a student can take courses from two emphasis areas**. **Taking classes from more than two areas is highly discouraged**.
    e. If an MSEE student takes courses from 3 or more different emphasis areas, the employers may not find that student suitable for any of their positions after graduation.
3. A student can take a minimum of 12 Credit Hours (4 Courses) to a maximum of 30 Credit Hours (10 Courses) from one emphasis area (if courses are available). For example, suppose a student decides to emphasize in the “Power, Renewable Energy, and Control” area. In that case, the student can select all 10 courses from that area because there are more than ten (10) relevant graduate-level courses available at UMKC.

Emphasis Areas

Computers, Embedded Systems, and Microelectronics

Code	Title	Credits
E&C-ENGR 5528	Advanced Embedded Systems	3
E&C-ENGR 5535	Hdl-Based Digital Systems Design	3
E&C-ENGR 5542	Introduction to VLSI Design	3
E&C-ENGR 5590	Special Topics In Electrical And Computer Engineering (Advanced Computer Architecture)	3
E&C-ENGR 5533	Analog Integrated Circuit Design	3
E&C-ENGR 5534	Computer Arithmetic	3
E&C-ENGR 5537	Mixed-Signal Integrated Circuit Design	3
E&C-ENGR 5642	Advanced VLSI Design	3

Electromagnetics and Radio Frequency (RF) Circuits and Systems

Code	Title	Credits
E&C-ENGR 5513	Advanced Principles of RF/Microwave Engineering	3
E&C-ENGR 5590	Special Topics In Electrical And Computer Engineering (Nanoelectronics and Plasmonics)	3
E&C-ENGR 5590NM	Special Topics In Electrical And Computer Engineering (Numerical Methods in EM)	3
E&C-ENGR 5590	Special Topics In Electrical And Computer Engineering (Introduction to Microwave Engineering)	3
E&C-ENGR 5590	Special Topics In Electrical And Computer Engineering (RF Experimental Design)	3
E&C-ENGR 5512	Microwave Remote Sensing	3
E&C-ENGR 5518	Advanced Radar Systems & Techniques	3
E&C-ENGR 5606	Electromagnetic Scattering and Antenna Theory	3

Communication, Networking and Signal Processing

Code	Title	Credits
E&C-ENGR 5570	Principles of Digital Communication Systems	3
E&C-ENGR 5577	Wireless Communications	3
E&C-ENGR 5580	Digital Signal Processing	3
CSEE 5110	Network Architecture I	3
CSEE 5111	Network Architecture II	3
CSEE 5113	Network Routing	3
E&C-ENGR 477	Introduction to Wireless Networking	3

Nanotechnology

Code	Title	Credits
E&C-ENGR 5590	Special Topics In Electrical And Computer Engineering (Nanoscale Devices and Circuits)	3
E&C-ENGR 5633	Nanoelectronics II: Nanoscale Integration & Manufacturing	3
E&C-ENGR 5647	Emerging Interdisciplinary Research in Nanotechnology	3
E&C-ENGR 5590	Special Topics In Electrical And Computer Engineering (Nanoelectronics and Plasmonics)	3

Computer Vision, Multimedia, and Machine Learning

Code	Title	Credits
E&C-ENGR 5316	Deep Learning	3
E&C-ENGR 5578	Multimedia Communication	3
E&C-ENGR 5582	Computer Vision	3
E&C-ENGR 5586	Pattern Recognition	3
E&C-ENGR 5584	Advanced Digital Image Processing	3

Power, Renewable Energy, and Control

Code	Title	Credits
E&C-ENGR 436	Power Electronics I	3
E&C-ENGR 5536	Power Electronics II	3
E&C-ENGR 5556	Advanced Instrumentation and Control	3
E&C-ENGR 5557	Fundamentals of Solar Photovoltaic Cells	3
E&C-ENGR 5558	Automatic Control System Design	3
E&C-ENGR 5559	Introduction to Photovoltaic Systems	3
E&C-ENGR 5560	Electric Power Distribution Systems	3
E&C-ENGR 5563	Sustainable Energy System Engineering	3
E&C-ENGR 5565	Auxiliary Electric System Design	3
E&C-ENGR 5567	Power Systems II	3
E&C-ENGR 5568	Economics of Power Systems	3
E&C-ENGR 5590	Special Topics In Electrical And Computer Engineering (Introduction to Power System Protection)	3
E&C-ENGR 5590	Special Topics In Electrical And Computer Engineering (Wind Energy)	3
E&C-ENGR 5590	Special Topics In Electrical And Computer Engineering (Introduction to Smart Grid)	3
E&C-ENGR 5590	Special Topics In Electrical And Computer Engineering (Advanced Photovoltaic System Engineering)	3
E&C-ENGR 5590PQ	Special Topics In Electrical And Computer Engineering (Power Quality)	3

E&C-ENGR 5590SP	Special Topics In Electrical And Computer Engineering (Transmission System Planning & Impact Studies)	3
E&C-ENGR 5664	Lightning and Switching Surges in Power Systems	3
E&C-ENGR 5672	Power Systems Relaying	3