MASTER OF SCIENCE IN ELECTRICAL ENGINEERING

The purpose of this degree is to prepare students for advanced study and industry in the field of electrical engineering. The Master of Science in Electrical Engineering (M.S.E.E.) is a degree program combining breadth across several areas of study within electrical engineering and specialization within one area, which includes an option to pursue thesis research under the guidance of a faculty adviser. Areas of study include communication and signal processing, computers and microelectronics, and power and control systems. The program is normally completed in three semesters of full-time study.

The admission requirements for this degree follow the existing admission requirements for master's degrees in the ECE department. Students whose accredited B.S. degree is not in electrical engineering may pursue the M.S.E.E., provided that they have an adequate background and can demonstrate proficiency in the material contained in undergraduate courses equivalent to Illinois Institute of Technology's:

ECE 211	Circuit Analysis I	3
ECE 213	Circuit Analysis II	4
ECE 218	Digital Systems	4
ECE 307	Electrodynamics	4
ECE 308	Signals and Systems	3
ECE 311	Engineering Electronics	4
MATH 251	Multivariate and Vector Calculus	4
MATH 252	Introduction to Differential Equations	4

A student may demonstrate proficiency by successfully completing the courses or by satisfactory performance in one or more special examinations administered by the department.

The program of study includes a minimum of 32 credit hours of acceptable graduate coursework, with a minimum of 20 credit hours of ECE courses at the 500-level or higher. Up to six credit hours of ECE short courses may be applied to the degree.

Students, with adviser approval, select courses appropriate to their needs and interests. The program of study must include a minimum of four courses within one of the electrical engineering (EE) areas of concentration and a minimum of two courses from the other areas. An M.S.E.E. candidate may, with permission of a thesis adviser, include in their program a thesis of six to eight credit hours. The master's thesis is recommended for pre-doctoral students. The thesis option requires a written thesis and an oral defense of the thesis. Thesis format and deadlines are set by the Graduate College.

Master of Science in Electrical Engineering (Coursework Only Option)

Requirement	Credits
Minimum Credits Required	32
Maximum 400-Level Credit	12
Minimum 500-Level ECE Credit	20
Maximum 700-Level Credit	6
Maximum Transfer Credit	9

Code	Title	Credit Hours
Electrical Engineering Major Courses		**(12-16)**
Select four courses from the chosen EE area of concentration from the lists below (p. 2)		12-16
Electrical Engineering Minor Electives		**(6-8)**
Select two courses from either or both of the remaining EE areas of concentration (p. 2)		6-8
General Electives		**(14)**
Select 14 credit hours of general ECE electives		14

Master of Science in Electrical Engineering (Thesis Option)

Requirement	Credits
Minimum Credits Required	32
Maximum 400-Level Credit	12
Minimum 500-Level ECE Credit	20
Maximum 700-Level Credit	6
Maximum Transfer Credit	9

Code	Title	Credit Hours
Electrical Engineering Major Courses		**(12-16)**
Select four courses from the chosen EE area of concentration from the lists below (p. 2)		12-16
Electrical Engineering Minor Electives		**(6-8)**
Select two courses from either or both of the remaining EE areas of concentration (p. 2)		6-8
General Electives		**(8)**
Select eight credit hours of general ECE electives		8
Thesis Research		**(6-8)**
ECE 591	Research and Thesis for Masters Degree [1]	6-8

[1] Students pursuing the thesis option must complete six to eight credit hours of research work (ECE 591) leading to an M.S. dissertation with the approval of a thesis adviser.

EE Areas of Concentration

Communications and Signal Processing

Code	Title	Credit Hours
ECE 401	Communication Electronics	3
ECE 403	Digital and Data Communication Systems	3-4
or ECE 405	Digital and Data Communication Systems with Laboratory	
ECE 406	Wireless Communications Systems	3
or ECE 504	Wireless Communication System Design	
ECE 421	Microwave Circuits and Systems	3-4
or ECE 423	Microwave Circuits and Systems with Laboratory	
ECE 437	Digital Signal Processing I	3-4
or ECE 436	Digital Signal Processing I with Laboratory	
ECE 481	Image Processing	3
ECE 505	Applied Optimization for Engineers	3
ECE 507	Imaging Theory & Applications	3
ECE 508	Video Communications	3
ECE 509	Electromagnetic Field Theory	3
ECE 511	Analysis of Random Signals	3
ECE 513	Communication Engineering Fundamentals	3
ECE 514	Digital Communication Principles	3
ECE 515	Modern Digital Communications	3
ECE 516	Coding for Distributed Storage Systems	3
ECE 519	Coding for Reliable Communications	3
ECE 520	Information Theory and Applications	3
ECE 522	Electromagnetic Compatibility	3
ECE 565	Computer Vision and Image Processing	3
ECE 566	Machine and Deep Learning	3
ECE 567	Statistical Signal Processing	3
ECE 568	Digital Speech Processing	3
ECE 569	Digital Signal Processing II	3

ECE 570	Fiber-Optic Communication Systems	3
ECE 576	Antenna Theory	3
ECE 578	Microwave Theory	3

Computers and Microelectronics

Code	Title	Credit Hours
ECE 408	Introduction to Computer Networks	3-4
or ECE 407	Introduction to Computer Networks with Laboratory	
ECE 425	Analysis and Design of Integrated Circuits	3
ECE 429	Introduction to VLSI Design	4
ECE 430	Fundamentals of Semiconductor Devices	3
or ECE 523	Fundamentals of Semiconductor Devices	
ECE 441	Smart and Connected Embedded System Design	4
ECE 442	Internet of Things and Cyber Physical Systems	3
or ECE 510	Internet of Things and Cyber Physical Systems	
ECE 443	Introduction to Computer Cyber Security	3
or ECE 518	Computer Cyber Security	
ECE 444	Computer Network Security	3
or ECE 543	Computer Network Security	
ECE 446	Advanced Logic Design	4
ECE 447	Artificial Intelligence and Edge Computing	3
or ECE 501	Artificial Intelligence and Edge Computing	
ECE 448	Application Software Design	3
or ECE 528	Application Software Design	
ECE 449	Object-Oriented Programming and Machine Learning	3
or ECE 590	Object-Oriented Programming and Machine Learning	
ECE 485	Computer Organization and Design	3
or ECE 585	Computer Organization and Design	
ECE 502	Basic Network Theory	3
ECE 503	5G Wireless Network: Architecture, New Radio, and Security	3
ECE 517	Modern Wireless Network Protocols and Standards	3
ECE 521	Quantum Electronics	3
ECE 524	Advanced Electronic Circuit Design	3
ECE 525	RF Integrated Circuit Design	3
ECE 526	Active Filter Design	3
ECE 527	Performance Analysis of RF Integrated Circuits	3
ECE 529	Advanced VLSI Systems Design	3
ECE 530	High Performance VLSI IC Systems	3
ECE 541	Communications Networks Performance Analysis	3
ECE 542	Design and Optimization of Computer Networks	3
ECE 544	Wireless and Mobile Networks	3
ECE 545	Modern Internet Technologies	3
ECE 546	Wireless Network Security	3
ECE 571	Nanodevices and Technology	3
ECE 575	Electron Devices	3
ECE 583	High Speed Computer Arithmetic	3
ECE 584	VLSI Architecture for Signal Processing and Communication Systems	3
ECE 586	Hardware Security and Advanced Computer Architectures	3
ECE 587	Hardware/Software Codesign	3
ECE 588	Hardware Acceleration for Machine Learning	3
ECE 589	Computer-Aided Design of Analog IC	3

Power and Control

Code	Title	Credit Hours
ECE 411	Power Electronics	4
ECE 412	Hybrid Electric Vehicle Drives	3-4
or ECE 512	Hybrid Electric Vehicle Drives	
ECE 417	Power Distribution Engineering	3
ECE 418	Power System Analysis	3-4
or ECE 419	Power Systems Analysis with Laboratory	
ECE 420	Analytical Methods for Power System Economics and Cybersecurity	3
ECE 438	Control Systems	3
ECE 505	Applied Optimization for Engineers	3
ECE 506	Analysis of Nonlinear Systems	3
ECE 512	Hybrid Electric Vehicle Drives	3
ECE 531	Linear System Theory	3
ECE 533	Robust Control	3
ECE 535	Discrete Time Systems	3
ECE 537	Next Generation Smart Grid	3
ECE 538	Renewable Energies	3
ECE 539	Computer Aided Design of Electric Machines	3
ECE 540	Reliability Theory and System Implementation	3
ECE 548	Energy Harvesting	3
ECE 549	Motion Control Systems Dynamics	3
ECE 550	Power Electronic Dynamics and Control	3
ECE 551	Advanced Power Electronics	3
ECE 552	Adjustable Speed Drives	3
ECE 553	Power System Planning	3
ECE 554	Power System Relaying	3
ECE 555	Power Market Operations	3
ECE 556	Power Market Economics and Security	3
ECE 557	Fault-Tolerant Power Systems	3
ECE 558	Power System Reliability	3
ECE 559	High Voltage Power Transmission	3
ECE 560	Power Systems Dynamics and Stability	3
ECE 561	Deregulated Power Systems	3
ECE 562	Power System Transaction Management	3
ECE 563	Artificial Intelligence in Smart Grid	3
ECE 564	Control and Operation of Electric Power Systems	3
ECE 579	Operations and Planning and Distributed Power Grid	3
ECE 580	Elements of Sustainable Energy	3
ECE 581	Elements of Smart Grid	3
ECE 582	Microgrid Design and Operation	3