

ELECTRICAL AND COMPUTER ENGINEERING

Program Information

The Department of Electrical and Computer Engineering offers the Master of Science and Doctor of Philosophy degrees. Minimum requirements for these degrees are given in the Graduate Degrees (<http://catalog.ufl.edu/graduate/degrees/>) section of this catalog.

The department offers graduate study and research in computer engineering, devices, electromagnetics and energy systems, electronics, and signals and systems.

Graduate students in the Department of Electrical and Computer Engineering have bachelor's degrees from many areas: electrical engineering, other engineering disciplines, chemistry, mathematics, physics, and other technical fields. The Department of Electrical and Computer Engineering offers both thesis and non-thesis options for the master's degrees.

In the *thesis option* a student shall complete a minimum of 30 semester credit hours with a maximum of 6 semester credit hours of EEL 6971 Research for Master's Thesis (1-15 cr.). While the Graduate School sets the minimum requirements, the supervisory committee determines the appropriate number of thesis hours a student shall be required to take for the thesis. Other course requirements include a minimum of 18 hours at the 5000 or 6000 level in electrical and computer engineering. Excluded from satisfying these course requirements are EEL 5905 Individual Work (1-4 cr.) and EEL 6905 Individual Work (1-4 cr.), EEL 6910 Supervised Research (1-5 cr.), EEL 6932, EEL 6940 Supervised Teaching (1-5 cr.), and EEL 6971 Research for Master's Thesis (1-15 cr.). No more than 6 hours of Individual Work (EEL 5905 Individual Work (1-4 cr.) or EEL 6905 Individual Work (1-4 cr.)) may be counted toward the degree.

In the non-thesis option a student shall complete a minimum of 30 semester credit hours with a maximum of 6 semester credit hours of Individual Work (EEL 5905 Individual Work (1-4 cr.) or EEL 6905 Individual Work (1-4 cr.)). The course requirements include a minimum of 21 semester credit hours at the 5000 or 6000 level in electrical and computer engineering. Excluded from satisfying these course requirements are EEL 5905 Individual Work (1-4 cr.) and EEL 6905 Individual Work (1-4 cr.), EEL 6910 Supervised Research (1-5 cr.), EEL 6932, EEL 6940 Supervised Teaching (1-5 cr.), and EEL 6971 Research for Master's Thesis (1-15 cr.).

The Department also offers a combined bachelor's/master's degree program. This program allows qualified students to earn both a bachelor's degree and master's degree with a saving of one semester. Qualified students may begin their master's programs while seniors, counting up to 12 hours of specified electrical and computer engineering graduate courses for both bachelor's and master's degree requirements. Bachelor's/master's program admission requirements are

1. satisfaction of Graduate School admission requirements for the master's degree,
2. an upper-division (undergraduate) GPA of at least 3.3, and
3. completion of at least 7 EEL core courses and 2 EEL laboratories.

Students with a GPA between 3.3 and 3.59 can double count up to 6 hours, while students with a GPA of 3.6 or higher can double count up to 12 hours.

All prospective doctoral students must take the written part of the Ph.D. qualifying examination within the first year of enrollment. Other requirements for the doctoral degree, as well as requirements for master's and engineer degrees, are given in the Electrical and Computer Engineering Department's Graduate Guidelines (see <http://www.ece.ufl.edu/content/graduate-academics> (<http://www.ece.ufl.edu/content/graduate-academics/>)) and in the front section of this catalog.

The following course listing indicates the major areas of faculty interest. Special topics courses EEL 5934 Special Topics in Electrical Engineering (1-3 cr.) and EEL 6935 Special Topics in Electrical Engineering (1-4 cr.) cover a wide variety of subjects for which there are no present courses.

Degrees Offered

Degrees Offered with a Major in Electrical and Computer Engineering

- Doctor of Philosophy
 - without a concentration
 - concentration in Clinical and Translational Science
- Master of Engineering
- Master of Science

Requirements for these degrees are given in the Graduate Degrees (<http://catalog.ufl.edu/graduate/degrees/>) section of this catalog.

Courses

Electrical and Computer Engineering Program Courses

Code	Title	Credits
CNT 6805	Network Science and Applications	3
EEE 5216	Introduction to Biophotonics	3
EEE 5225	Resonant MEMS	3
EEE 5283	Neural Signals, Systems and Technology	3
EEE 5317C	Introduction to Power Electronics	3
EEE 5320	Analog IC Design I	3
EEE 5322	VLSI Circuits and Technology 1	3
EEE 5364	Fundamentals of Data Converters	3
EEE 5374	Radio Frequency Electronics	3
EEE 5400	Future of Microelectronics Technology	3
EEE 5405	Microelectronic Fabrication Technologies	3
EEE 5408	Mixed Signal IC Testing I	3
EEE 5426	Introduction to Nanodevices	3
EEE 5467	Micro/Nano Machined Metamaterials	3
EEE 5502	Foundations of Digital Signal Processing	3
EEE 5544	Stochastic Methods for Engineering 1	3
EEE 5556		3
EEE 5702	Automated Hardware/Software Verification	3
EEE 5716	Introduction to Hardware Security and Trust	3
EEE 5725	Acoustics	3
EEE 6287		3
EEE 6321	Analog IC Design II	3
EEE 6323	VLSI Circuits and Technology 2	3
EEE 6328C	Microwave IC Design	3
EEE 6374	RF Circuits and Systems	3
EEE 6382	Semiconductor Physical Electronics	3
EEE 6390	VLSI Device Design	3
EEE 6397	Semiconductor Device Theory I	3
EEE 6428	Nanoscale Devices for VLSI Technology	3

EEE 6431	Carbon Nanotubes	3
EEE 6460	Advanced Microsystem Technology	3
EEE 6465	Design of MEMS Transducers	3
EEE 6503		3
EEE 6504	Machine Learning for Time Series	3
EEE 6512	Image Processing and Computer Vision	3
EEE 6561	Fundamentals of Biometric Identification	3
EEE 6586	Automatic Speech Processing	3
EEE 6715		3
EEE 6742	Advanced Hardware Security and Trust	3
EEL 5182	State Variable Methods in Linear Systems	3
EEL 5225	Principles of Micro-Electro-Mechanical Transducers	3
EEL 5250	Power System Analysis	3
EEL 6275	Power System Protection	3
EEL 5285	Smart Grid for Sustainable Energy	3
EEL 5406	Computational Photography	3
EEL 5417	Applied Magnetism & Magnetic Materials	3
EEL 5426	RF/Microwave Passive Circuits	3
EEL 5441	Fundamentals of Photonics	3
EEL 5447	Laser Theory and Design	3
EEL 5462	Advanced Antenna Systems	3
EEL 5490	Lightning	3
EEL 5547	Introduction to Radar	3
EEL 5666C	Intelligent Machines Design Laboratory	4
EEL 5718	Computer Communications	3
EEL 5721	Reconfigurable Computing	3
EEL 5733	Advanced Systems Programming	3
EEL 5737	Principles of Computer System Design	3
EEL 5764	Computer Architecture	3
EEL 5840	Fundamentals of Machine Learning	3
EEL 5855	Cross Layered Systems Security	3
EEL 5905	Individual Work	1-4
EEL 5934	Special Topics in Electrical Engineering	1-3
EEL 6065		3
EEL 6246	Power Electronics II	3
EEL 5486	Electromagnetic Fields and Applications	3
EEL 6487	Electromagnetic Field Theory and Applications II	3
EEL 6507	Queuing Theory and Data Communications	3
EEL 6509	Wireless Communication	3
EEL 6528	Digital Communications with Software-defined Radios	3
EEL 6532	Information Theory	3
EEL 6533	Data Analytics and Decision Sciences	3
EEL 6535	Digital Communications	3
EEL 6537	Spectral Sensing and Sparse Signal Recovery	3
EEL 6550	Error Correction Coding	3
EEL 6555	Signal Processing for Active Sensing	3
EEL 6588	Wireless Ad Hoc Networks	3
EEL 6591	Wireless Networks	3
EEL 6614	Modern Control Theory	3
EEL 6617	Linear Multivariable Control	3
EEL 6686	Embedded Systems Seminar	3
EEL 6706	Fault-Tolerant Computer Architecture	3
EEE 6744	Hands-On Hardware Security	3
EEL 6761	Cloud Computer Systems and Applications	3
EEL 6763	Parallel Computer Architecture	3
EEL 6814	Neural Networks and Deep Learning	3
EEL 6825	Pattern Recognition and Intelligent Systems	3
EEL 6841	Machine Intelligence and Synthesis	3
EEL 6871	Cloud Computing Systems Management	3

EEL 6892	Virtual Computers	3
EEL 6905	Individual Work	1-4
EEL 6910	Supervised Research	1-5
EEL 6933	Electrical and Computer Engineering Graduate Seminar	1
EEL 6935	Special Topics in Electrical Engineering	1-4
EEL 6940	Supervised Teaching	1-5
EEL 6971	Research for Master's Thesis	1-15
EEL 7979	Advanced Research	1-12
EEL 7980	Research for Doctoral Dissertation	1-15

Electrical and Computer Engineering Departmental Courses

Code	Title	Credits
ABE 5009	Control Methods in SmartAg Systems	3
CNT 6805	Network Science and Applications	3
EEE 5216	Introduction to Biophotonics	3
EEE 5225	Resonant MEMS	3
EEE 5283	Neural Signals, Systems and Technology	3
EEE 5317C	Introduction to Power Electronics	3
EEE 5320	Analog IC Design I	3
EEE 5322	VLSI Circuits and Technology 1	3
EEE 5354L	Semiconductor Device Fabrication Laboratory	3
EEE 5364	Fundamentals of Data Converters	3
EEE 5374	Radio Frequency Electronics	3
EEE 5400	Future of Microelectronics Technology	3
EEE 5405	Microelectronic Fabrication Technologies	3
EEE 5408	Mixed Signal IC Testing I	3
EEE 5415	Modern Memory Device Technologies	3
EEE 5426	Introduction to Nanodevices	3
EEE 5467	Micro/Nano Machined Metamaterials	3
EEE 5502	Foundations of Digital Signal Processing	3
EEE 5544	Stochastic Methods for Engineering 1	3
EEE 5702	Automated Hardware/Software Verification	3
EEE 5716	Introduction to Hardware Security and Trust	3
EEE 5725	Acoustics	3
EEE 6321	Analog IC Design II	3
EEE 6323	VLSI Circuits and Technology 2	3
EEE 6328C	Microwave IC Design	3
EEE 6374	RF Circuits and Systems	3
EEE 6382	Semiconductor Physical Electronics	3
EEE 6390	VLSI Device Design	3
EEE 6397	Semiconductor Device Theory I	3
EEE 6428	Nanoscale Devices for VLSI Technology	3
EEE 6431	Carbon Nanotubes	3
EEE 6460	Advanced Microsystem Technology	3
EEE 6465	Design of MEMS Transducers	3
EEE 6504	Machine Learning for Time Series	3
EEE 6512	Image Processing and Computer Vision	3
EEE 6561	Fundamentals of Biometric Identification	3
EEE 6586	Automatic Speech Processing	3
EEE 6742	Advanced Hardware Security and Trust	3
EEE 6744	Hands-On Hardware Security	3
EEL 5182	State Variable Methods in Linear Systems	3
EEL 5225	Principles of Micro-Electro-Mechanical Transducers	3
EEL 5249	Fundamentals of RF and Power Electronic Devices	3
EEL 5250	Power System Analysis	3
EEL 5285	Smart Grid for Sustainable Energy	3

EEL 5406	Computational Photography	3
EEL 5417	Applied Magnetism & Magnetic Materials	3
EEL 5426	RF/Microwave Passive Circuits	3
EEL 5441	Fundamentals of Photonics	3
EEL 5447	Laser Theory and Design	3
EEL 5462	Advanced Antenna Systems	3
EEL 5486	Electromagnetic Fields and Applications	3
EEL 5490	Lightning	3
EEL 5547	Introduction to Radar	3
EEL 5632	Safety and Security of Vehicular Electronic Systems	3
EEL 5666C	Intelligent Machines Design Laboratory	4
EEL 5718	Computer Communications	3
EEL 5721	Reconfigurable Computing	3
EEL 5733	Advanced Systems Programming	3
EEL 5737	Principles of Computer System Design	3
EEL 5739	IoT Security and Privacy	3
EEL 5749	IoT Design	3
EEL 5764	Computer Architecture	3
EEL 5840	Fundamentals of Machine Learning	3
EEL 5855	Cross Layered Systems Security	3
EEL 5905	Individual Work	1-4
EEL 5934	Special Topics in Electrical Engineering	1-3
EEL 6246	Power Electronics II	3
EEL 6275	Power System Protection	3
EEL 6487	Electromagnetic Field Theory and Applications II	3
EEL 6507	Queuing Theory and Data Communications	3
EEL 6509	Wireless Communication	3
EEL 6528	Digital Communications with Software-defined Radios	3
EEL 6532	Information Theory	3
EEL 6533	Data Analytics and Decision Sciences	3
EEL 6535	Digital Communications	3
EEL 6537	Spectral Sensing and Sparse Signal Recovery	3
EEL 6550	Error Correction Coding	3
EEL 6555	Signal Processing for Active Sensing	3
EEL 6588	Wireless Ad Hoc Networks	3
EEL 6591	Wireless Networks	3
EEL 6614	Modern Control Theory	3
EEL 6617	Linear Multivariable Control	3
EEL 6686	Embedded Systems Seminar	3
EEL 6706	Fault-Tolerant Computer Architecture	3
EEL 6761	Cloud Computer Systems and Applications	3
EEL 6763	Parallel Computer Architecture	3
EEL 6814	Neural Networks and Deep Learning	3
EEL 6825	Pattern Recognition and Intelligent Systems	3
EEL 6841	Machine Intelligence and Synthesis	3
EEL 6871	Cloud Computing Systems Management	3
EEL 6892	Virtual Computers	3
EEL 6905	Individual Work	1-4
EEL 6910	Supervised Research	1-5
EEL 6933	Electrical and Computer Engineering Graduate Seminar	1
EEL 6935	Special Topics in Electrical Engineering	1-4
EEL 6940	Supervised Teaching	1-5
EEL 6971	Research for Master's Thesis	1-15
EEL 7979	Advanced Research	1-12
EEL 7980	Research for Doctoral Dissertation	1-15
EGN 5949	Practicum/Internship/Cooperative Work Experience	1-6

EGN 6640	Entrepreneurship for Engineers	3
EGN 6913	Engineering Graduate Research	0-3

College of Engineering Courses

Code	Title	Credits
EEE 5354L	Semiconductor Device Fabrication Laboratory	3
EGN 5010L	NRF Training Lab	1
EGN 5949	Practicum/Internship/Cooperative Work Experience	1-6
EGN 6640	Entrepreneurship for Engineers	3
EGN 6642	Engineering Innovation	3
EGN 6913	Engineering Graduate Research	0-3
EGN 6933	Special Topics	1-3
EGN 6937	Engineering Fellowship Preparation	0-1
EGS 6039	Engineering Leadership	3
EGS 6101	Divergent Thinking	3
EGS 6626	Fundamentals of Engineering Project Management	3
EGS 6628	Advanced Practices in Engineering Project Management	3
EGS 6681	Advanced Engineering Leadership	3
EMA 6581	Polymeric Biomaterials	3
ESI 6900	Principles of Engineering Practice	1-4

Student Learning Outcomes

Electrical & Computer engineering (PHD)

SLO 1 Knowledge
Ability to identify, formulate and solve engineering problems. Ability to critically read and integrate engineering research literature

SLO 2 Skills
Ability to use applied mathematical and/or modern experimental techniques. Ability to use modern engineering tools for practice at an advanced level

SLO 3 Professional Behavior
Ability to communicate effectively

Electrical & Computer Engineering (Me & Ms)

SLO 1 Knowledge
Ability to identify, formulate and solve electrical and computer engineering problems

SLO 2 Skills
Ability to use applied mathematical techniques. Ability to use modern engineering tools for practice at an advanced level