Doctor of Philosophy in Electrical Engineering (BS Entry)

About This Program

The Doctor of Philosophy in Electrical Engineering is a degree with emphasis on research. It provides for students who wish to increase knowledge in many areas of electrical engineering. Graduate study and research are offered in five fields.

COMMUNICATION AND SIGNAL PROCESSING

Communication and signal processing connect our digital world. This field uses fundamental theory in signal and information processing, designs spectrum and energy efficient communications system or sensor networks for data gathering and transmission, and keeps pushing the boundaries of scientific discovery. Recent examples include 5G mobile wireless communications, Internet of Things, Machine Learning, Big Data, Virtual Reality, etc.

COMPUTER AND DIGITAL CIRCUIT

Computer and digital circuit engineering integrates digital electronics with computer sciences, involving hardware and software in a wide range of industry sectors and consumers' daily lives. Many of our household and commercial items make use of digital electronics, including computers, smartphones, vehicles, airplanes, televisions, remote controls, and other entertainment systems. Computer hardware engineers, including digital circuit designers, work on developing microprocessors, memory chips, data storage, and computer networking devices while computer software engineers develop operating systems, computer programs, computer networks, and software securities. Local employers include Texas Instruments, TSMC, Facebook, Lockheed Martin, Intel, Mathworks, and Boeing.

CONTROL SYSTEMS

Control systems engineering studies the design and implementation of feedback control systems which are responsible for the safe and efficient automatic operation of all human engineered systems. Examples include aircraft autopilots, automobile speed control, automated drug delivery, and industrial process control. The theoretical basis for modern control systems was developed during the Industrial Revolution in the 18th century for the steam engine, steam locomotive, and automated windmills.

PHOTONICS AND ELECTRONICS

Photonics is the science of using light to generate energy, detect information, or transmit information. The main purpose of the photonics engineering field is to develop new and innovative products for medicine, telecommunications, manufacturing, and construction. From light that can connect all electronic devices, to ultra-performance lasers used in data centers and autonomous cars, photonics engineers are responsible for significant scientific discoveries and smart societies.

POWER AND ENERGY

Power systems engineers design, develop, and operate electrical power systems. The field is broad and becoming broader with deregulation, smart grid development, decarbonization, and inverter-based resources. Future power systems engineers will have to implement more intelligent control, low environmental impact resources, battery storage systems, and power electronic converters for global power system transformation.

Competencies

1. Upon graduation, students will demonstrate mastery of advanced concepts in electrical engineering, enabling them to innovate and contribute original research to the field.
2. Upon graduation, students will be able to identify, analyze, and solve complex electrical engineering problems using advanced theoretical and computational tools.
3. Upon graduation, students will design, execute, and disseminate independent research that addresses significant challenges in electrical engineering and adheres to the highest ethical and professional standards.
4. Upon graduation, students will effectively collaborate across disciplines, leveraging their expertise in electrical engineering to contribute to diverse, multidisciplinary projects.
5. Upon graduation, students will demonstrate the ability to communicate complex engineering concepts and research findings effectively to both technical and non-technical audiences, while also exhibiting leadership in academic and professional settings.

Admissions Criteria

The admission process considers all of the application material including official transcripts, letters of recommendation, statement of purpose, and answers to EE Department supplementary questions. No single objective factor is used to finalize the decision for admission or to deny admission.
It is expected that an applicant have background in such areas as linear systems, dc and ac electronics circuits, static and dynamic electromagnetic fields, microprocessors, among the courses completed in a typical electrical engineering curriculum. Students with an BS in other fields are encouraged to apply, but they may be required to remedy a lack of required EE courses by taking additional EE courses. An attempt will be made to match the

technical aspirations of the potential graduate students with the departmental resources in order to provide a stimulating academic environment for the students and their graduate education. GRE is not required for admission.

UNCONDITIONAL ADMISSION

In addition to general requirements for graduate admission (https://catalog.uta.edu/academicregulations/admissions/graduate/), a typical applicant who is admitted will have met the following:

- Document a minimum undergraduate GPA of 3.5.
- Hold a rigorous undergraduate degree relevant to the EE curriculum from a reputable institution.
- Have published in scholarly conferences/journals (this is optional but will improve both a student's chances of securing admission and receiving financial support).
- Provide three recommendation letters from individuals who can judge the probability of success of the student's graduate study.
- Satisfactory answers to the EE Department supplementary questions.

For an international students the program will give preference to students with a TOEFL score of 79 with a minimum of 22 writing, 21 speaking, 20 reading, and 16 listening; or IELTS scores of 6.5 in all categories.

PROVISIONAL ADMISSION

An applicant unable to supply all required official documentation prior to the admission deadline, but whose available documentation otherwise appears to meet admission requirements may be granted provisional admission.

DEFERRED STATUS

A deferred decision may be granted when a file is incomplete.

DENIED STATUS

An applicant who does not meet requirements in any category above will be denied admission.

PART-TIME STATUS

US industrial or government employees who will work full time in electrical engineering or related areas may be granted part-time status. Part-time students maintain residency if enrolled in at least 3 hours each long semester.

FELLOWSHIPS

Award of a fellowship will be based on the criteria required by the sponsor agency (including the graduate school) on a competitive basis.

Curriculum

PhD Electives		
Complete 30 elective hours with at least 21 hours of advanced electives.		30
Select up to three from the following:		
EE 5302	RANDOM SIGNALS AND NOISE	
EE 5304	CYBER-PHYSICAL SYSTEMS	
EE 5305	ANALOG INTEGRATED CIRCUIT DESIGN	
EE 5306	ELECTROMAGNETIC THEORY	
EE 5307	LINEAR SYSTEMS ENGINEERING	
EE 5308	POWER SYSTEM MODELING AND ANALYSIS	
EE 5340	SEMICONDUCTOR DEVICE THEORY	
EE 5350	DIGITAL SIGNAL PROCESSING	
EE 5362	DIGITAL COMMUNICATIONS	
EE 5380	PRINCIPLES OF PHOTONICS AND OPTICAL ENGINEERING	
EE 6375	POWER ELECTRONICS ENGINEERING	
Or other course approved by advisor.		
Advanced Electives		
Select at least seven from the following (Part-time students may substitute up to 12 hours in EE 6397 or EE 6697 for required electives):		
EE 5190	ELECTRICAL ENGINEERING GRADUATE SEMINAR	
EE 5191	ADVANCED STUDY IN ELECTRICAL ENGINEERING	
EE 5309	TOPICS IN ELECTRICAL ENGINEERING	

EE 5310	DIGITAL VLSI DESIGN
EE 5311	VLSI SIGNAL PROCESSING ARCHITECTURES
EE 5312	CMOS RFIC DESIGN
EE 5313	MICROPROCESSOR SYSTEMS
EE 5314	EMBEDDED MICROCONTROLLER SYSTEMS
EE 5315	SYSTEM ON CHIP (SOC) DESIGN
EE 5316	CMOS MIXED SIGNAL IC DESIGN
EE 5317	ADVANCED DIGITAL VLSI DESIGN
EE 5319	TOPICS IN DIGITAL SYSTEMS
EE 5321	OPTIMAL CONTROL
EE 5322	INTELLIGENT CONTROL SYSTEMS
EE 5323	NONLINEAR SYSTEMS
EE 5325	ROBOTICS
EE 5327	SYSTEM IDENTIFICATION AND ESTIMATION
EE 5329	TOPICS IN SYSTEMS ENGINEERING
EE 5330	DISTRIBUTED DECISION AND CONTROL
EE 5331	RF SYSTEMS ENGINEERING
EE 5332	ANTENNA SYSTEM ANALYSIS
EE 5333	WAVE PROPAGATION AND SCATTERING
EE 5334	FUNDAMENTALS OF RADAR REMOTE SENSING
EE 5335	FUNDAMENTALS OF RADAR IMAGING
EE 5336	FOUNDATIONS OF MEDICAL IMAGING
EE 5338	COMPUTATIONAL METHODS IN ELECTRICAL ENGINEERING
EE 5339	TOPICS IN ELECTROMAGNETICS
EE 5341	ELECTRONIC MATERIALS: FUNDAMENTALS AND APPLICATIONS
EE 5342	SEMICONDUCTOR DEVICE MODELING AND CHARACTERIZATION
EE 5343	SILICON INTEGRATED CIRCUIT FABRICATION TECHNOLOGY
EE 5344	INTRODUCTION TO MICROELECTROMECHANICAL SYSTEMS (MEMS) AND DEVICES
EE 5345	INTRODUCTION TO BIO-NANOTECHNOLOGY
EE 5346	MICROWAVE DEVICES
EE 5348	RADIO-FREQUENCY CIRCUIT DESIGN
EE 5349	TOPICS IN INTEGRATED CIRCUIT TECHNOLOGY
EE 5351	DIGITAL VIDEO CODING
EE 5352	STATISTICAL SIGNAL PROCESSING
EE 5353	NEURAL NETWORKS AND DEEP LEARNING
EE 5354	MACHINE LEARNING
EE 5355	DISCRETE TRANSFORMS AND THEIR APPLICATIONS
EE 5356	DIGITAL IMAGE PROCESSING
EE 5357	STATISTICAL PATTERN RECOGNITION
EE 5358	COMPUTER VISION
EE 5359	TOPICS IN SIGNAL PROCESSING
EE 5360	DATA COMMUNICATIONS ENGINEERING
EE 5364	INFORMATION THEORY FOR DATA SCIENCE
EE 5365	FIBER OPTIC TRANSMISSION SYSTEMS
EE 5368	WIRELESS COMMUNICATION AND IoT
EE 5369	TOPICS IN COMMUNICATIONS
EE 5370	ELECTRIC MOTOR DRIVES
EE 5371	POWER SYSTEM PLANNING, OPERATION, AND CONTROL IN A DEREGULATED ENVIRONMENT
EE 5372	CONGESTION MANAGEMENT
EE 5373	UNBUNDLING SERVICES OF A DEREGULATED POWER SYSTEM
EE 5374	POWER SYSTEM PROTECTIVE RELAYING
EE 5375	POWER SYSTEM DISTRIBUTION

EE 5376	POWER SYSTEM RELIABILITY IN PLANNING AND OPERATION	
EE 5377	PROGRAMMABLE LOGIC CONTROLLERS IN INDUSTRIAL AUTOMATION	
EE 5378	POWER QUALITY	
EE 5379	TOPICS IN POWER SYSTEM ENGINEERING	
EE 5381	FOUNDATIONS IN SEMICONDUCTORS	
EE 5382	OPTICAL DETECTORS AND RADIATION	
EE 5383	SOLAR ELECTRICITY & PHOTOVOLTAICS	
EE 5384	OPTOELECTRONIC DEVICES FOR COMMUNICATION	
EE 5385	NONLINEAR OPTICS	
EE 5386	INTEGRATED OPTICS	
EE 5387	FOURIER OPTICS AND HOLOGRAPHY	
EE 5388	LASERS	
EE 5389	TOPICS IN OPTICS	
EE 5391	ADVANCED STUDY IN ELECTRICAL ENGINEERING	
EE 6313	ADVANCED MICROPROCESSOR SYSTEMS	
EE 6314	ADVANCED EMBEDDED MICROCONTROLLER SYSTEMS	
EE 6321	INTRODUCTION TO UNMANNED VEHICLE SYSTEMS	
EE 6322	UNMANNED VEHICLE SYSTEM DEVELOPMENT	
EE 6342	ADVANCED QUANTUM DEVICES	
EE 6343	QUANTUM WELL LASERS	
EE 6344	NANOSYSTEMS AND QUANTUM ELECTRONIC DEVICES	
EE 6345	ADVANCED MEMS -- MICROELECTROMECHANICAL SYSTEMS	
EE 6353	CONVEX OPTIMIZATION FOR ENGINEERS	
EE 6356	IMAGE AND VIDEO CODING	
EE 6364	ADVANCED DATA NETWORKS	
EE 6365	ADVANCED FIBER OPTICS SYSTEMS	
EE 6367	ADVANCED AND NEXT-G WIRELESS COMMUNICATIONS	
EE 6373	RENEWABLE ENERGY SYSTEMS	
EE 6381	NANOPHOTONICS	
EE 6382	OPTICAL BIOSENSORS: INSTRUMENTATION AND TECHNIQUES	
EE 6397	RESEARCH IN ELECTRICAL ENGINEERING	
EE 6697	RESEARCH IN ELECTRICAL ENGINEERING	
Or other course approved by advisor.		
Disseratation		
Complete at least 9 hours in the folllowing.		9
EE 6399	DISSERTATION	
EE 6999	DISSERTATION	
EE 6699	DISSERTATION	
EE 7399	DOCTORAL DEGREE COMPLETION	
Total Hours		**39**

Program Completion

A student working toward a PhD must maintain a 3.5 GPA in all electrical engineering coursework and at least a 3.5 GPA in all coursework. Approval to continue in the doctoral program is given by:

1. Obtaining the approval of a dissertation adviser, and
2. Passing the Diagnostic Examination. This exam will be over the two Technical Proficiency areas selected by the student.

This procedure must be completed within the year of coursework toward the PhD. A student not having attempted the Diagnostic Examination by this time will be allowed one more opportunity to take the examination during the next full semester.

The status of a doctoral candidate is approved for students who have passed an oral Comprehensive Examination (a comprehensive dissertation proposal) and submitted a Final Program of Work. If the student fails the examination, he/she would be given one more chance to pass it no later than during the following semester. Upon completion of the Diagnostic Examination, the candidate should enroll in the dissertation course EE 6699

(https://catalog.uta.edu/search/?P=EE%206699) DISSERTATION or EE 7399 (https://catalog.uta.edu/search/?P=EE%207399). The student can only enroll in EE 7399 (https://catalog.uta.edu/search/?P=EE%207399) DOCTORAL DEGREE COMPLETION one time. If the student does not graduate in the semester EE 7399 (https://catalog.uta.edu/search/?P=EE%207399) is used, all future semesters the student must enroll in EE 6699 (https://catalog.uta.edu/search/?P=EE%206699) until the dissertation is defended.

A student's supervisory committee shall consist of at least three members of the Graduate Faculty, a majority of whom must be in Electrical Engineering.

Advising Resources

EE Advising - General information

ELECTRICAL ENGINEERING

Location:

Master's - NH 531

Ph.D. - NH 545

Email:

ee_grad_advising@uta.edu

Phone:

Master's - 817-272-3423

Ph.D. - 817-272-3472

Web:

Master's - Schedule graduate advising (https://outlook.office365.com/owa/calendar/EEGradAdv@bookings.uta.edu/bookings/s/W_X-t8ySDEaqCfz09loAMg2/)

Ph.D. - Schedule graduate advising (https://outlook.office365.com/owa/calendar/EEGradAdv@bookings.uta.edu/bookings/s/ja39PnPrvEC3KPK1JroI9A2/)