Electrical Engineering, PhD

Doctor of Philosophy in Electrical Engineering Degree Program Requirements

The minimum required coursework beyond the Master's degree is 53 semester credit hours (SCH). This credit hour requirement includes coursework prescribed for students in support of an area of concentration (9 SCH), free electives in support of doctoral dissertation and specialization (15 SCH), doctoral research (12 SCH), dissertation (12 SCH), stochastic process course (3 SCH) and graduate seminars (2 SCH). Courses taken during a master's degree program may not be repeated for credit at the doctoral degree level.

Students that take the ELEG 6331 Stochastic Processes course (receiving a grade of at least a B) as a Master's degree student or as a non-degree seeking certificate student at PVAMU, who then proceed to the PhD-EE program, must substitute for the Stochastic Processes course a graduate level (5000 – 7000 level) course that is related to their dissertation topic. This substitution course requires the approval of the student's dissertation advisor or the graduate coordinator. Note: No more than three 5000 level courses may be taken toward the free elective requirements for the PhD-EE.

Required Courses

ELEG 6101	Graduate Seminar I	1
ELEG 6102	Graduate Seminar II	1
ELEG 6331	Stochastic Processes	3
ELEG 7601	Doctoral Research I	6
ELEG 7602	Doctoral Research II	6
ELEG 7691	Doctoral Dissertation I	6
ELEG 7692	Doctoral Dissertation II	6
Elective Courses Prescribed for Students		
6000 or 7000 level Electrical Engineering courses selected from one of the Electrical Engineering tracks.		9
Free Electives		
5000 to 7000 level graduate courses, but not more than 9 SCH course at the 5000 level will be accepted.		15
Total Hours		**53**

Courses for Electrical Engineering Tracks

(A) Computer Engineering Track

ELEG 6310	Advanced Computer Systems Design	3
ELEG 6311	Computer Architecture & Advanced Logic Design	3
ELEG 6312	The Internet: Design and Implementation	3
ELEG 6314	Fault Tolerant Computing	3
ELEG 6315	Information Networks	3
ELEG 6316	Statistical Learning for Big Data	3
ELEG 6318	Deep Learning	3
ELEG 6360	Modern Artificial Intellegence	3
ELEG 6361	Advanced Artificial Intelligence	3
ELEG 6365	Intro to High Perf Computing	3
ELEG 6370	Selected Topics in Deep Learning	3
ELEG 6380	Introduction to Bioinformatics	3
ELEG 6381	Advanced Bioinformatics	3
ELEG 6382	Computational Systems Biology	3
ELEG 6383	Computational Modeling of Biological Systems	3
ELEG 7310	Advanced Topics in Computer Engineering	3

(B) Communication and Signal Processing Track

ELEG 6320	Wireless Networks	3
ELEG 6321	Digital Communication	3
ELEG 6322	Coding Theory	3
ELEG 6324	Advanced Broadband Communications Systems	3
ELEG 6325	Telecommunications Network Security	3

ELEG 6330	Signal Detection and Estimation	3
ELEG 6331	Stochastic Processes	3
ELEG 6312	The Internet: Design and Implementation	3
ELEG 6333	Wavelets and Their Applications	3

(C) Microelectronics Track

ELEG 6342	VLSI and ULSI Design	3
ELEG 6350	Advanced Photonics Materials and Devices	3
ELEG 6351	Advanced Quantum Devices	3
ELEG 6352	Advanced Characterization of Materials and Devices	3
ELEG 6354	Advanced Solid State	3

(D) Power Engineering Track

ELEG 6371	Power System Faults Protective	3
ELEG 6372	Power System Stability	3
ELEG 6373	High Voltage Direct Current	3
ELEG 6374	Power Gen Oper Control	3
ELEG 6375	Advanced Power System	3
ELEG 6376	Power Electronics Power System	3
ELEG 6377	Advanced Electric Drives	3
ELEG 6378	Advanced Power Electronics	3
ELEG 6385	Fundamentals of Power Electronics and Motor Drives	3
ELEG 6386	Renewable Energy Sources	3
ELEG 6387	Smart Grid: Fundamentals of Design and Analysis	3

Free Electives

Electrical Engineering Technical Electives

ELEG 6310	Advanced Computer Systems Design	3
ELEG 6311	Computer Architecture & Advanced Logic Design	3
ELEG 6312	The Internet: Design and Implementation	3
ELEG 6314	Fault Tolerant Computing	3
ELEG 6315	Information Networks	3
ELEG 6316	Statistical Learning for Big Data	3
ELEG 6318	Deep Learning	3
ELEG 6320	Wireless Networks	3
ELEG 6321	Digital Communication	3
ELEG 6322	Coding Theory	3
ELEG 6324	Advanced Broadband Communications Systems	3
ELEG 6325	Telecommunications Network Security	3
ELEG 6330	Signal Detection and Estimation	3
ELEG 6331	Stochastic Processes	3
ELEG 6333	Wavelets and Their Applications	3
ELEG 6342	VLSI and ULSI Design	3
ELEG 6350	Advanced Photonics Materials and Devices	3
ELEG 6351	Advanced Quantum Devices	3
ELEG 6352	Advanced Characterization of Materials and Devices	3
ELEG 6354	Advanced Solid State	3
ELEG 6360	Modern Artificial Intellegence	3
ELEG 6361	Advanced Artificial Intelligence	3
ELEG 6365	Intro to High Perf Computing	3
ELEG 6370	Selected Topics in Deep Learning	3
ELEG 6371	Power System Faults Protective	3

ELEG 6372	Power System Stability	3
ELEG 6373	High Voltage Direct Current	3
ELEG 6374	Power Gen Oper Control	3
ELEG 6375	Advanced Power System	3
ELEG 6376	Power Electronics Power System	3
ELEG 6377	Advanced Electric Drives	3
ELEG 6378	Advanced Power Electronics	3
ELEG 6380	Introduction to Bioinformatics	3
ELEG 6381	Advanced Bioinformatics	3
ELEG 6382	Computational Systems Biology	3
ELEG 6383	Computational Modeling of Biological Systems	3
ELEG 6385	Fundamentals of Power Electronics and Motor Drives	3
ELEG 6386	Renewable Energy Sources	3
ELEG 6387	Smart Grid: Fundamentals of Design and Analysis	3
ELEG 6391	Special Topics in Elec Engr [1]	3
ELEG 7310	Advanced Topics in Computer Engineering	3
Other Technical Electives		
CHEG 5302	Microelectronics Materials	3
CINS 5306	Data Structures and Algorithms	3
COMP 5315	Design and Analysis of Algorithms	3
CVEG 5300	Physical/Chemical Unit Operations in Water and Wastewater Treatment	3
CVEG 5303	Finite Element Analysis	3
GNEG 5304	Engineering Probability and Statistics	3
GNEG 5306	Engineering Analysis I	3
GNEG 5307	Engineering Analysis II	3
GNEG 5313	Engineering Numerical Methods	3
GNEG 5319	Special Topics [1]	3
MCEG 5302	Advanced Thermodynamics	3
MCEG 5325	Advanced Engineering Materials	3

[1]   Special topics courses vary in content and may cover areas such as artificial intelligence, machine learning, cybersecurity, and power systems.

Marketable Skills

Marketable skills, as defined by the Texas Higher Education Coordinating Board's 60x30TX Plan (http://www.60x30tx.com/), include interpersonal, cognitive, and applied skill areas, are valued by employers, and can be either primary or complementary to a major. Marketable skills are acquired by students through education, including curricular, co-curricular, and extracurricular activities.

PhD Electrical Engineering

Degree Skills

1. Ability to communicate new and innovative research findings to engineers and scientists
2. Proficient in the general body of knowledge in electrical engineering
3. Advanced understanding of specialized knowledge in electrical engineering and specialized areas of computer engineering, Communication and Signal Processing, Microelectronics and Power Engineering

Concentration Skills

1. Advanced understanding of deep learning for artificial intelligence
2. Advanced understanding of the smart grid
3. Advanced understanding of cybersecurity and broadband communications

Co-curricular and Extracurricular Skills

1. Ability to teach/mentor in the electrical engineering field
2. Ability to propose and develop novel solutions to electrical engineering problems
3. Ability to lead original research and development in electrical engineering