ELECTRICAL ENGINEERING (EENG), BACHELOR OF SCIENCE

At Dunwoody College of Technology, the Electrical Engineering bachelor's degree prepares students to enter the field of engineering as electrical engineers and work to solve many of the problems facing our society. Graduates can find employment in a variety of industries, including energy, construction, medical, telecommunications, transportation, and computing.

Students learn to apply engineering principles, to work collaboratively, and to create electrical or electronic systems. Coursework includes study in electronics, mechatronics, signals and system theory, power systems, and digital systems. Curriculum is project-integrated so that theoretical engineering principles are reinforced and experienced through hands-on creation and problem-solving.

Arts & Sciences courses help students understand the core mathematical and scientific principles that all engineering projects grow out of as well as provide students with the communication and critical thinking skills required to succeed in the profession.

All students complete a senior project.

Credential Earned: BS
Length of Program: 4 years (8 semesters)
Classes Offered: Day
Available Starts: Fall Semester

Program Outcomes

- EAC 1: An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- EAC 2: An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- EAC 3: An ability to communicate effectively with a range of audiences.
- EAC 4: An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- EAC 5: An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- EAC 6: An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- EAC 7: An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Degree Requirements

Code	Title	Credits
General Requirements		
CHEM2110	Chemistry with Lab	4
ECON1000		
MATH1811	Calculus I	4
MATH1821	Calculus II	4
MATH2260	Probability & Statistics	4
MATH2810	Multi-Variable Calculus	4
MATH2820	Linear Algebra & Differential Equations	4
PHYS1800	Physics I with Lab	4
PHYS1820	Physics II with Lab	4
SPCH1000	Speech	3
WRIT2010	Technical Writing	3
Humanities		3
Social Sciences		3
Technical Requirements		
ENGR1210	Introduction to Programming	3
ENGR1110	Introduction to Engineering	3
ENGR1115	Intro to Automation,Robotics, & Sensors	2
EENG1240	Circuit Fundamentals I	3
EENG1241	Circuit Fundamentals I Lab	1
EENG1210	Logic & Digital Design	2
EENG1220	Logic & Digital Design Lab	1
MDES1110	Engineering Drawings with SolidWorks	4
ENGR1230	Networking, Data Security for Engr	4
EENG2112	Circuit Fundamentals II	3
EENG2122	Circuit Fundamentals II Lab	1
EENG2132	Digital Systems	3
EENG2210	Analog Circuits	3
EENG2220	Analog Circuits Lab	1
EENG3110	Advanced Analog Circuits	3
EENG3120	Advanced Analog Circuits Lab	1
EENG3131	Signals & Systems	3
ENGR2210	Mechatronics with Lab	2
ENGR3120	Engineering Economics	2
EENG3260	Motors & Controls	4
EENG3211	Digital & Microprocessors Systems	3
EENG3220	Digital & Microprocessors Systems lab	1
EENG3150	Topics in Applied Instrumentation	3
SENG3240	Connected Device Development II	3
EENG4110	Communication Systems	3
EENG4120	Communication Systems Lab	1
EENG4150	Senior Design Project I	2
EENG4141	Power System Analysis & Design	4
ENGR4110	Engineering Ethics	2
EENG4231	DSP & Filters	3
EENG4250	Senior Design Project II	4
Total Credits		**122**

Courses

Descriptions

ENGR1210 | Introduction to Programming | Lecture/Laboratory (3 Credits)
Examine and implement computational problem-solving strategies using computer languages to solve engineering problems. Develop algorithms and translate solutions into computer programs. Distinguish differences in programming languages and software tools with applicability to different types of problem solutions. Apply modular design and clear documentation for efficient problem solving.

ENGR1110 | Introduction to Engineering | Lecture (3 Credits)
Explore major topics in Engineering. Provides a pathway to success in the School of Engineering programs, including time management, industry software, study skills, teamwork skills, internship availability and career opportunities.

ENGR1115 | Intro to Automation,Robotics, & Sensors | Lecture/Laboratory (2 Credits)
Explore major topics in Automation, Robotics and Sensors as well as learning software tools and practical design and construction techniques to support studies in Electrical and Computer Engineering.

EENG1240 | Circuit Fundamentals I | Lecture (3 Credits)
Analyze fundamental circuits. Investigate the relationship between voltage, current, power and energy. Identify and predict responses of RC and RL circuits. Must be taken with EENG1241.
Corequisite(s): EENG1241

EENG1241 | Circuit Fundamentals I Lab | Laboratory (1 Credit)
Analyze fundamental circuits in a lab environment. Investigate the relationship between voltage, current, power and energy. Identify and predict responses of RC and RL circuits. Must be taken with EENG1240.
Corequisite(s): EENG1240

EENG1210 | Logic & Digital Design | Lecture (2 Credits)
Introduction to logic gates and state machines. The foundations of number systems and binary logic are implemented using logic gates. Karnaugh maps are used to realize Boolean algebra, leading to combinational logic circuits. State machines such as flip-flops, counters, and registers are analyzed.
Corequisite(s): EENG1220

EENG1220 | Logic & Digital Design Lab | Laboratory (1 Credit)
Build logic circuits and state machines in a laboratory environment from scratch using components such as IC chips and breadboards. Measure inputs and outputs using oscilloscopes and logic analyzers. Explore potential uses and implementations for real world solutions. Model design with Hardware Description Language coding.
Corequisite(s): EENG1210

MDES1110 | Engineering Drawings with SolidWorks | Lecture (4 Credits)
Creation of 3D solid models, assemblies and related engineering documentation using SolidWorks. Blueprint reading and application of ASME/ANSI standards to CAD drawings.

ENGR1230 | Networking, Data Security for Engr | Lecture/Laboratory (4 Credits)
Explore data communications, cybersecurity, and Internet of Things (IoT) in a connected world. Explain computer networking concepts with data security in mind. Identify security concepts and security audit processes as well as career opportunities in connectivity/networking/security disciplines.

EENG2112 | Circuit Fundamentals II | Lecture (3 Credits)
Examine transient and steady state conditions in complex circuits. Investigate power, power factor, and power transfer. Explore frequency using Fourier analysis, Bode plots, passive filters and transfer functions.
Prerequisite(s): EENG1240
Corequisite(s): EENG2122

EENG2122 | Circuit Fundamentals II Lab | Laboratory (1 Credit)
Prototype various circuits and determine values using electrical metrology tools and techniques. Compare expected behavior against measured responses.
Prerequisite(s): EENG1240 And EENG1241
Corequisite(s): EENG2112

EENG2132 | Digital Systems | Lecture/Laboratory (3 Credits)
Examine various systems through abstraction from the basic concepts of digital blocks. Use hardware description languages such as Verilog to design the digital systems. Work with memory and programmable logic devices and FPGAs to design and program reconfigurable systems.
Prerequisite(s): EENG1210

EENG2210 | Analog Circuits | Lecture (3 Credits)
Analysis of continuous variable systems. Discuss non-linear components such as diodes and transistors. Explore more advanced concepts and components including multi-transistor amplifiers and op-amps.
Prerequisite(s): EENG2110
Corequisite(s): EENG2220

EENG2220 | Analog Circuits Lab | Laboratory (1 Credit)
Design and construct circuits, focusing on prototyping and debugging, using common electrical engineering equipment and tools.
Prerequisite(s): EENG2120
Corequisite(s): EENG2210

EENG3110 | Advanced Analog Circuits | Lecture (3 Credits)
Evaluate various typologies of circuits and determine useful implementations. Practical design considerations include physical constraints, non-ideal characteristics of transistors, active loads, frequency response, and feedback.
Prerequisite(s): EENG2210
Corequisite(s): EENG3120

EENG3120 | Advanced Analog Circuits Lab | Laboratory (1 Credit)
Design, model, prototype, and fabricate project(s) in an interactive applied lab.
Prerequisite(s): EENG2220
Corequisite(s): EENG3110

EENG3131 | Signals & Systems | Lecture (3 Credits)
Introduction to the foundation of communications, signal processing and control theory. Analyze linear time invariant continuous and discrete systems and signal transformations, convolution, frequency spectra, Laplace transforms, Z transforms, and fast Fourier transforms.
Prerequisite(s): MATH2820

ENGR2210 | Mechatronics with Lab | Lecture/Laboratory (2 Credits)
Analyze electrical and mechanical systems such as drives, sensors, control systems, data presentation, and communication in the context of mechatronics. Different motive forces are utilized, control systems implemented, and operating environment challenges presented. Course content is applied to real-world projects.

ENGR3120 | Engineering Economics | Lecture (2 Credits)
Economic analysis of engineering decisions under uncertainty. Concepts include time value of money, cash flow estimation, rate of return analysis, net present value estimation, and asset evaluation. Applications include comparing different project alternatives accounting for heterogeneity in cost, revenue, taxation, depreciation, inflation, and risk.

EENG3260 | Motors & Controls | Lecture/Laboratory (4 Credits)
Examine the fundamentals of electrical motor control components, circuits and systems. Topics include electrical control symbols, power distribution, control transformers, solenoids and relays, motor starters, pilot devices, timers and sequencers, DC and AC motor principles, proximity sensors and troubleshooting.
Prerequisite(s): EENG3110

EENG3211 | Digital & Microprocessors Systems | Lecture (3 Credits)
Investigate microprocessor and microcontroller operations. Explain registers, memory and I/O interfacing principles. Describe embedded systems and their applications in real world systems. Utilize microprocessor/microcontroller for embedded system Hardware/Software development.
Prerequisite(s): EENG2132
Corequisite(s): EENG3220

EENG3220 | Digital & Microprocessors Systems lab | Laboratory (1 Credit)
Implement embedded systems using different hardware platforms and different programming languages. Demonstrate the design considerations for systems ranging from basic to complex applications.
Prerequisite(s): EENG2132
Corequisite(s): EENG3211

EENG3150 | Topics in Applied Instrumentation | Lecture/Laboratory (3 Credits)
Introduction to various types of instrumentation and control schemas. Topics include pressure, temperature, level and flow detection and calculations. Lab activities include calibration, tuning and installation of various analog and smart equipment used in industry.
Prerequisite(s): EENG3110

SENG3240 | Connected Device Development II | Lecture/Laboratory (3 Credits)
Advanced study of Internet connected devices. Design and implement applications and services for mobile and smart devices such as smartphones, smart displays, smart speakers. The Android architecture and operating system will be primarily used. Design challenges and opportunities in the mobile/smart device market. Students must have a strong background in application development, the software lifecyle/tooling, and Operating Systems.
Prerequisite(s): SENG3400

EENG4110 | Communication Systems | Lecture (3 Credits)
Apply signal and system theory to analog and digital communication. Distinguish characteristics of contemporary communication standards.
Prerequisite(s): EENG3110, EENG3131, And EENG3211
Corequisite(s): EENG4120

EENG4120 | Communication Systems Lab | Laboratory (1 Credit)
Implement and evaluate electrical communication systems in an investigative laboratory.
Prerequisite(s): EENG3110, EENG3131, EENG3211, And MATH2260
Corequisite(s): EENG4110

EENG4150 | Senior Design Project I | Capstone (2 Credits)
Investigate current real world electrical engineering industries, applications, and challenges. Prepare and present a project proposal to an industry panel. Discuss best practices in project management. Projects will be executed in the following semester.

EENG4141 | Power System Analysis & Design | Lecture/Laboratory (4 Credits)
Examine how modern power systems are designed, implemented and controlled. Explain the power system in terms of reliability, safety and maintainability. Modeling and simulation are used in the analysis and conceptual design and study of regulatory codes related to power systems.
Prerequisite(s): EENG3260

ENGR4110 | Engineering Ethics | Lecture (2 Credits)
Interpret the connection between personal morality, the role of engineers and engineering in society, and relationship to one's employer. Case studies involving conflicts within these roles are reviewed and evaluated.

EENG4231 | DSP & Filters | Lecture (3 Credits)
Analyze Discrete-time signals and systems. Design and implement Digital Filters. Compute Signal Spectrum using FFT algorithms. Implement DSP solutions using industry standard solutions and design tools offered by companies such as Texas Instruments, and ON Semiconductor. Contrast DSP and Microprocessor solutions in meeting performance standards.
Prerequisite(s): EENG4110

EENG4250 | Senior Design Project II | Capstone (4 Credits)
Execute project proposal from Senior Project I. Construct a working prototype. Display of project documentation. Present to a jury of peers, faculty and industry representatives.

CHEM2110 | Chemistry with Lab | Lecture/Laboratory (4 Credits)
Develop a basic understanding of the central principles of chemistry that are useful to explain and predict the properties of chemical substances based on their atomic and molecular structure; promotes the development of basic and advanced science process skills.
General Education: Physical Sciences with Lab

MATH1811 | Calculus I | Lecture (4 Credits)
The fundamental tool used by engineers and scientists to determine critical measurements, such as maximums, minimums and allowable rates of change. Utilize multiple methods in the calculation and application of limits, derivatives, transcendental functions, implicit differentiation and related rates.
General Education: Mathematics

MATH1821 | Calculus II | Lecture (4 Credits)
The fundamental tool used by engineers and scientists to determine critical measurements such as the area under curves, the volumes within complex geometries, and for describing functions as an infinite series. Computer software enables the application of the definite integral, the fundamental theorem of calculus, applications of integration, and numerical methods of integration.
Prerequisite(s): MATH1811 Or MATH1812
General Education: Mathematics

MATH2260 | Probability & Statistics | Lecture (4 Credits)
Introduction to probability and statistics with applications. Topics include: basic combinatorics, random variables, probability distributions, hypothesis testing, confidence intervals, and linear regression.
Prerequisite(s): MATH1810, Or MATH1811, Or MATH1812
General Education: Mathematics

MATH2810 | Multi-Variable Calculus | Lecture (4 Credits)
Differentiate and integrate functions of two and three variables. Apply differentiation and integration techniques to physical sciences and engineering. Explore the theorems of Green and Stokes.
Prerequisite(s): MATH1820 Or MATH1821
General Education: Mathematics

MATH2820 | Linear Algebra & Differential Equations | Lecture (4 Credits)
Introduction to Linear Algebra, including vector spaces and linear mappings between such spaces. Explore solution methods for ordinary differential equations, qualitative techniques; includes matrix methods approach to systems of linear equations and series solutions.
Prerequisite(s): MATH1821 Or MATH1820
General Education: Mathematics

PHYS1800 | Physics I with Lab | Lecture/Laboratory (4 Credits)
Introduction to mechanics using differential calculus as a foundation. Topics include kinematics and dynamics of linear motion, static equilibrium, the conservation of energy and momentum, mechanics of solids and fluids, and thermodynamics. The laboratory portion incorporates experimentation, instrumentation, and graphical tools to verify calculations in motion, mechanics and thermodynamics.
Prerequisite(s): MATH1810 Or MATH1811
General Education: Physical Sciences with Lab

PHYS1820 | Physics II with Lab | Lecture/Laboratory (4 Credits)
An introductory calculus-based course in electromagnetic fields and their applications. Topics include: Coulomb's and Gauss' Law, electric fields and potentials, electrical and magnetic properties of matter, Ampere's and Faraday's laws, elementary DC and AC circuits, Maxwell's equations, and electromagnetic waves.
Prerequisite(s): MATH1821, Or MATH1820, And PHYS1800
General Education: Physical Sciences with Lab

SPCH1000 | Speech | Lecture (3 Credits)
Introduction to public speech making; purpose and organization, audience analysis and response, verbal and non-verbal clues.
General Education: Communications

WRIT2010 | Technical Writing | Lecture (3 Credits)
Technical writing applications are studied for format, style, voice, and point of view; considered for purpose, audience, and subject. Critical thinking and developed expertise are employed to analyze, interpret, evaluate, summarize and generate various technical documents, individually and within teams.
General Education: Communications