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

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- 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.
- An ability to communicate effectively with a range of audiences.
- 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.
- 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.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- 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	Introduction to Micro & Macro Economics	3
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		
EENG1210	Logic & Digital Design	2
EENG1220	Logic & Digital Design Lab	1
EENG1231	Circuit Fundamentals I	3
EENG2110	Circuit Fundamentals II	2
EENG2120	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
EENG3150	Topics in Applied Instrumentation	3
EENG3160	Codes, Tools, Skills for Elec Engr	4
EENG3140	Electrodynamics & Electromagnetics	3
EENG3211	Advanced Digital & Microprocessors	3
EENG3220	Advanced Digital & Microprocessors Lab	1
EENG3260	Motors & Controls	4
EENG4110	Communication Systems	3
EENG4120	Communication Systems Lab	1
EENG4141	Power System Analysis & Design	4
EENG4150	Senior Design Project I	2
EENG4231	DSP & Filters	3
EENG4250	Senior Design Project II	4
ENGR1110	Introduction to Engineering	3
ENGR1210	Introduction to Programming	3
ENGR1220	Intro to Automation, Mfg, Elec Dev & Sys	3
ENGR1230	Networking, Data Security for Engr	4
ENGR2100	Design Documentation	2
ENGR2210	Mechatronics with Lab	2
ENGR3120	Engineering Economics	2
ENGR4110	Engineering Ethics & Safety	2
Total Credits		**126**

Courses

Descriptions

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. This course must be taken at Dunwoody for the Industrial Engineering Technology Degree.

ENGR1210 | Introduction to Programming | Lec/Lab (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.

ENGR1220 | Intro to Automation, Mfg, Elec Dev & Sys | Lec/Lab (3 Credits)
Apply PLCs and electronic components to design and troubleshoot automated industrial equipment. Topics include AC and DC motors, programming, sensors and basic circuit analysis techniques for design, analysis, and programming of control systems.

ENGR1230 | Networking, Data Security for Engr | Lec/Lab (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.

ENGR2100 | Design Documentation | Laboratory (2 Credits)
Apply documentation standards to support Electrical Engineering design in automation, construction, and printed wireboard fabrication.

ENGR2210 | Mechatronics with Lab | Lec/Lab (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.

ENGR4110 | Engineering Ethics & Safety | 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. Interpret safety and accident information to develop a basic understanding of needed safety protocols in a variety of engineering environments.

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

EENG1231 | Circuit Fundamentals I | Lec/Lab (3 Credits)
Analyze fundamental circuits. Investigate the relationship between voltage, current, power and energy. Identify and predict responses of RC and RL circuits.

EENG2110 | Circuit Fundamentals II | Lecture (2 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): EENG1231
Corequisite(s): EENG2120

EENG2120 | 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): EENG1231
Corequisite(s): EENG2110

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

EENG2132 | Digital Systems | Lec/Lab (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

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

EENG3140 | Electrodynamics & Electromagnetics | Lecture (3 Credits)
In depth discussion of electric and magnetic fields. Explore Maxwell's equations.
Prerequisite(s): MATH2810

EENG3150 | Topics in Applied Instrumentation | Lec/Lab (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
Corequisite(s): MATH2810

EENG3160 | Codes, Tools, Skills for Elec Engr | Lec/Lab (4 Credits)
Implement industry standard design documentation and software tools for manufacturing and construction electrical and electronic systems. Topics include printed wireboard, logic, wiring harnesses, automation, NFPA, and National Electrical Safety Code.
Prerequisite(s): EENG3110
Corequisite(s): MATH2810

EENG3211 | Advanced Digital & Microprocessors | 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 | Advanced Digital & Microprocessors 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): EENG3210 EENG3211

EENG3260 | Motors & Controls | Lec/Lab (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
Corequisite(s): MATH2810

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, And EENG3211
Corequisite(s): EENG4110

EENG4141 | Power System Analysis & Design | Lec/Lab (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

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.

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.

Policies

School of Engineering Policies

General Applicability

While college faculty will provide you with information and advice, it is your responsibility to understand and comply with all policies and to complete satisfactorily all degree requirements within the allotted time frame. This includes the responsibility to track your completion of major, university and campus requirements, as well to comply with residence, minimum progress and scholarship requirements.

For details, you should refer to the college's academic policies (https://catalog.dunwoody.edu/catalog-student-handbook/academic-policies/).

Please note that you are subject to current policies and regulations, regardless of your admission date.

Admission to Dunwoody School of Engineering

Your admission into the Dunwoody School of Engineering is also an admission into the engineering program you have selected. Your completion of this degree requires your compliance with stated degree requirements and academic good standing.

Applicability of Academic Plan

Normally the Academic Plan that you will follow is the plan year that you have entered under. However with program evolution we reserve the right to move you to a newer academic plan resulting from an evolution of the program. This change will not delay your graduation or cost you more than your original plan if you remain in academic good standing and take courses when offered.

In the event that you do not maintain continuous enrollment, your academic plan may be changed to your new admission date.

In the event of part time enrollment, academic plans will be valid for only 6 years.

School of Engineering Student Success Monitoring

The School of Engineering strives to motivate and empower students to complete courses of study leading to degrees in Electrical, Mechanical, Software Engineering and Industrial Engineering Technology. The

program of study in each of these disciplines is cumulative in nature, that is, content is intended to build upon content learned in earlier semesters.

Student academic progress must consider the level to which students have successfully mastered earlier concepts in determining if a student is making adequate progress in their chosen field of study.

Students will be determined to be making adequate progress toward degree completion if they are following the recommended program of study and are achieving grades of C or better in all of their courses each semester.

A student who is following the recommended program of study who receives a grade of less than a C in any technical or School of Engineering course will be required to meet their Academic Coordinator to review their study skills and to develop a plan for enhanced Academic Achievement for the next semester. This grade of less than C may result in an adjustment of the next semester schedule to support needed prerequisites or remedial measures.

Any student who is following the recommended program of study who receives two or more grades of C or lower in technical or School of Engineering courses will be required to meet with their Academic Coordinator and the School of Engineering Dean to determine appropriate next steps.

Any student who is not following the program of study defined by the Academic Plan will be required to meet with the Academic Coordinator each semester to ensure that they are registered for the appropriate courses.

Because of the cumulative nature of the Engineering program courses, no more than two passing grades of less than C will be allowed to count toward graduation. The final design experience(s) in all programs must be completed with a grade of no less than C.