AUTOMATION & CONTROLS ENGINEERING TECHNOLOGY (AENT), BACHELOR OF SCIENCE

Overview

At Dunwoody College of Technology, the Automation & Controls Engineering Technology program provides a bachelor's completion degree option for graduates of related two-year programs looking to advance into engineering and management positions. Related programs include degrees in electrical maintenance, electronics, mechatronics, industrial controls, and robotics.

The curriculum builds on a foundation in industrial electricity and controls by providing advanced coursework in: electrical CAD; advanced PLC applications; algorithm development; robotics; AC and DC drives; motion control; machine vision; automated guided vehicles (AGVs) and autonomous mobile robots (AMRs); factory automation; and project management.

Curriculum is lab-intensive, allowing students to apply knowledge of mathematics, science, and engineering to real-world projects.

Arts & Sciences curriculum supports the technical coursework by enhancing the students' communication and critical thinking skills.

The program also incorporates a senior capstone project in its final semester that gives students the chance to demonstrate industry-relevant controls engineering experience.

Credential Earned: BS
Length of Program: 2 Years (4 semesters)
Classes Offered: Evening
Available Starts: Fall Semester; Spring Semester

Program Outcomes

- ETAC 1: An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline.
- ETAC 2: An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
- ETAC 3: An ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature.
- ETAC 4: An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
- ETAC 5: An ability to function effectively as a member, as well as a leader, on technical teams.

Degree Requirements

Admitted students to Automation & Controls Engineering Technology (AENT) can transfer up to 40 technical credits, 15 General Education elective credits, and 3 Social Science credits. A transfer evaluation is required. Not all credits may transfer into the degree program.

Code	Title	Credits
Transfer		**55**
General Requirements		
CHEM2000	Introduction to Chemistry	3
COMM4100	Technical Writing Capstone	3
HUMN2900	Ethics of Artificial Intelligence	3
MATH1700	Pre Calculus	3
MATH1810	Calculus I	3
MATH1820	Calculus II	3
PHYS1800	Physics I with Lab	4
Social Science		3
Technical Requirements		
ENGR1110	Introduction to Engineering	3
AENT3110	Advanced Industrial Controllers with Lab	3
AENT3120	CAD for Electrical Controls	2
AENT3130	Engineering Project Management	2
AENT3210	AC, DC & Servo Motor Control with Lab	3
AENT3220	Engineering Statics & Dynamics	3
AENT3230	Machine Vision & Automated Inspection	2
AENT3240	Industrial Networks & IIoT	2
AENT4110	HMI & SCADA Systems with Lab	3
AENT4120	Fluid Power Engineering	3
AENT4130	Machine Safety & Risk Assessment	2
AENT4140	Autonomous Guided Vehicles	2
AENT4210	Industrial Automation with Lab	3
AENT4220	Applied Thermodynamics & Heat Transfer	3
AENT4295	Senior Capstone Project	4
Total Credits		**120**

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.

AENT3110 | Advanced Industrial Controllers with Lab | Lecture/ Laboratory (3 Credits)
Develop foundational skills in PLCs while introducing advanced topics and applications. Advanced applications include control algorithms, structured-text programming and network communications with a focus on system design and integration.

AENT3120 | CAD for Electrical Controls | Lecture (2 Credits)
Use E-CAD software to design and layout electrical and electronic circuits for use in both discrete manufacturing and process control systems.

AENT3130 | Engineering Project Management | Lecture (2 Credits)
Introduction to the tools and processes used to manage complex engineering and technology projects. Utilize industry standard software to develop budgets, timelines and project goals.

AENT3210 | AC, DC & Servo Motor Control with Lab | Lecture/Laboratory (3 Credits)
Examine the theories, calculations and applications of various motors and controls for the purpose of controlling industrial machinery and processes.
Prerequisite(s): AENT3110

AENT3220 | Engineering Statics & Dynamics | Lecture (3 Credits)
Apply vector algebra and differentiation to forces in equilibrium as well as the effects of forces on the motion of objects.
Prerequisite(s): MATH1810

AENT3230 | Machine Vision & Automated Inspection | Lecture (2 Credits)
Apply computer-based vision systems for automated inspection, data reporting and deep learning. Program and commission vision-based systems to inspect part features for the purpose of quality control and/or machine guidance.

AENT3240 | Industrial Networks & IIoT | Lecture (2 Credits)
Determine how industrial networks enable machines to communicate real-time data between sensors, machines and enterprises. Apply networking technology to the interface of controls and sensors using industry-standard network protocols.

AENT4110 | HMI & SCADA Systems with Lab | Lecture/Laboratory (3 Credits)
Analyze Supervisory Control & Data Acquisition (SCADA) systems and how they are used to display and control remote field devices for industrial processes. Topics include PC-based terminals, human machine interfaces (HMI), network communications and IEC 60870 standards.
Prerequisite(s): AENT3110

AENT4120 | Fluid Power Engineering | Lecture (3 Credits)
Explore the operation, performance characteristics and maintenance of fluid power systems and components. Perform mathematical calculations for application of pumps, motors, valves and cylinders.

AENT4130 | Machine Safety & Risk Assessment | Lecture (2 Credits)
Examine OSHA machine guarding requirements as they pertain to hazard prevention.

AENT4140 | Autonomous Guided Vehicles | Lecture (2 Credits)
Explore issues concerning the use of AGVs in the manufacturing industry, including material flow optimization, material handling and AGV risk factors.

AENT4210 | Industrial Automation with Lab | Lecture/Laboratory (3 Credits)
The fundamentals of industrial automation identifies the overlap of several automation components. Programmable controllers, machine vision systems, CNC machines and industrial robots are interfaced. Focus is on the justification for automation and productivity calculations.

AENT4220 | Applied Thermodynamics & Heat Transfer | Lecture (3 Credits)
Apply first and second laws of thermodynamics to closed and open systems. Topics include one-dimensional conduction, convection and radiation.
Prerequisite(s): AENT3220

AENT4295 | Senior Capstone Project | Capstone (4 Credits)
Demonstrate overall content knowledge of the program outcomes through a capstone automation project. Conduct a final presentation of the project and explain how it applies to the engineering program outcomes, with a focus on justification for automation and productivity calculations.
Prerequisite(s): WRIT4020

CHEM2000 | Introduction to Chemistry | Lecture (3 Credits)
Examine contemporary applications of chemistry in such areas as energy, technology and materials, pollution and waste. Applications illustrate many fundamental concepts in chemistry, such as molecular and electronic structure, mixtures, intermolecular forces, phase behavior, thermodynamics, electrochemistry, kinetics, and equilibria. Current and future global challenges are presented and discussed.
General Education: Natural Sciences

COMM4100 | Technical Writing Capstone | Lecture (3 Credits)
Research, plan, and organize professional documents for the capstone project. Topics include assessment techniques, special audience considerations, professional speaking skills, and presentation aids.
General Education: Communications with Writing

HUMN2900 | Ethics of Artificial Intelligence | Lecture (3 Credits)
Artificial Intelligence (AI) is changing how we work and how we live our everyday lives, and new tools are being developed at an astounding pace. From chatbots to robots, AI tools--especially for those in technical fields--are embedded in our professional and personal lives. Making sure they are developed and used ethically, and transparently, is imperative. In this course, you will learn how to identify, analyze, and debate the philosophical issues raised by contemporary and future AI systems.

MATH1700 | Pre Calculus | Lecture (3 Credits)
Preparation for Calculus. Topics include understanding functions from symbolic, tabular, and graphical perspectives. Explore function transformations and composition, polynomial functions, rational polynomial functions, trigonometric functions, exponential functions, and conic sections. The focus is on problem solving using mathematical models to represent real world situations.
General Education: Mathematics

MATH1810 | Calculus I | Lecture (3 Credits)
The fundamental tool used by engineers and scientists to determine critical measurements, such as maximums, minimums and allowable rates of change. Computer software will enable the application of limits, derivatives, transcendental functions, implicit differentiation and related rates.
Prerequisite(s): MATH1700
General Education: Mathematics

MATH1820 | Calculus II | Lecture (3 Credits)
The fundamental tool used by engineers and scientists to determine critical measurements, such as calculating the area under curves or the capacities inside of complex geometries. Computer software will enable the application of the definite integral, the fundamental theorem of calculus, applications of integration, and numerical methods of integration.
Prerequisite(s): MATH1810, Or MATH1811, Or MATH1812
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