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 mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline; 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; ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and ability to function effectively as a member as well as a leader on technical teams.

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

Program Outcomes
- 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;
- Ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
- Ability to apply knowledge of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline;
- Ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and
- Ability to function effectively as a member as well as a leader on technical teams.

Degree Requirements

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<th>Credits</th>
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<tr>
<td>MATH1700</td>
<td>Pre Calculus</td>
<td>3</td>
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<tr>
<td>PSYC3000</td>
<td>Organizational Behavior</td>
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<td>MATH1810</td>
<td>Calculus I</td>
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<td>COMM3000</td>
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<td>Calculus II</td>
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<td>WRIT4020</td>
<td>Capstone Technical Writing</td>
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<td>Calculus-Based Physics</td>
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<td>PHIL4000</td>
<td>Ethical Decision-Making</td>
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Technical Requirements
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<td>AENT3120</td>
<td>CAD for Electrical Controls</td>
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<tr>
<td>AENT3130</td>
<td>Engineering Project Management</td>
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<tr>
<td>AENT3210</td>
<td>AC, DC &amp; Servo Motor Control with Lab</td>
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<tr>
<td>AENT3220</td>
<td>Engineering Statics &amp; Dynamics</td>
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<td>AENT3230</td>
<td>Machine Vision &amp; Automated Inspection</td>
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<td>AENT3240</td>
<td>Industrial Networks &amp; IIoT</td>
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<tr>
<td>AENT4110</td>
<td>HMI &amp; SCADA Systems with Lab</td>
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<td>AENT4120</td>
<td>Fluid Power Engineering</td>
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<td>AENT4130</td>
<td>Machine Safety &amp; Risk Assessment</td>
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<td>AENT4140</td>
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<td>AENT4210</td>
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<td>AENT4220</td>
<td>Applied Thermodynamics &amp; Heat Transfer</td>
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<td>AENT4295</td>
<td>Senior Capstone Project</td>
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Total Credits 60

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 | Lec/Lab (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 | Lec/Lab (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.

Prerequisite(s): AENT3110

AENT4110 | HMI & SCADA Systems with Lab | Lec/Lab (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.

Prerequisite(s): AENT3220

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 | Lec/Lab (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.

Prerequisite(s): AENT3110

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): AENT3110

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

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

PSYC3000 | Organizational Behavior | Lecture (2 Credits)
Basic principles of human behavior that are used when managing individuals and groups in organizations. Includes theories relating to individual differences in abilities and attitudes, attribution, motivation, group dynamics, power and politics, leadership, conflict resolution, organizational culture, organizational structure and design as well as the process of ethical decision making for the employee, manager, and organization.

General Education: Upper Social Sciences

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

COMM3000 | Professional Communication | Lecture (2 Credits)
Professional communication in all forms: researching, selecting, synthesizing, and documenting sources; business e-mail and letter writing, as well as public speaking and power point presentation for application in a management setting.

General Education: Upper Communications

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

General Education: Mathematics

WRIT4020 | Capstone Technical Writing | Lecture (2 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: Upper Communications

PHYS1810 | Calculus-Based Physics | Lecture (3 Credits)
Introduction to mechanics using calculus, vectors and graphs to describe motion, and to analyze it in terms of forces and conservation laws. Applications include projectiles, orbits, oscillations and fluids.

Prerequisite(s): MATH1810 Or MATH1811

General Education: Natural Sciences

PHIL4000 | Ethical Decision-Making | Lecture (2 Credits)
Examine major moral theories of right and wrong, such as utilitarianism, deontology, egoism, virtue ethics, and feminism. Apply these theories in sound, ethical decision-making particularly in one's professional life. Through case studies, the consequences of a decision in terms of responsibilities to the company and the economy, to the people impacted by the decision, and to the environment at large are weighed. Explore the tension often created by the difference between what is morally right and what the company's code of ethics states or what the society's laws require.

General Education: Humanities