Mechanical & Electrical Engineering Technology

Matt Lawrence, Chair
Phone: 607-587-4652
Secretary Phone: 607-587-4617
Email: lawrenmj@alfredstate.edu

The Mechanical and Electrical Engineering Technology Department has several programs that prepare graduates to join the workforce as successful technical and management professionals in a variety of industries, including electrical engineering technology, mechanical engineering technology, engineering science and computer engineering technology. Because the department maintains active contact with related industries and professional societies and works closely with them to assist graduates in exploring their profession and creating contacts for employment, graduate placement is excellent. Educational opportunities also occur through projects, competitions, and field trips in addition to memberships in several active professional society student chapters.

MISSION

To prepare graduates for immediate employment and continued educational opportunities through a quality technical and experience-based education.

FACILITIES

- **Advanced electronics laboratory** – This lab includes workstations with computers controlling automated test equipment stations with a waveform generator, digitizing oscilloscope, multimeter, power supplies, programs for data analysis and circuit simulation, radio frequency (RF) and test data communications test equipment, and digital signal processing (DSP) trainers.
- **Automated manufacturing laboratory** – Students gain direct experience with computer numerical control (CNC) machines. New additions include a 3-axis HAAS mini mill and turning center.
- **Computer design laboratory** – This space is equipped as an industrial research and development laboratory in the area of computer systems dynamics. The facility enables students to analyze rotational equipment, industrial power transmission devices, and various computer linkage designs.
- **Control systems laboratory** – This lab provides experience with logic control systems as they apply to industrial processes utilizing microcontrollers, control relays, contactors, switches and programmable logic controllers. Students learn the logical sequence of controls and understand different applications by designing, fabricating, and testing systems.
- **Electromechanical and industrial automation system laboratory** – This lab provides an integrated engineering systems approach toward understanding automation principles with emphasis on embedded microcontrollers. It also introduces the student to general characteristics of electromechanical sensors and transducers, electrical measurement systems, electronic signal conditioning, and response characteristics of instruments. Computers in the laboratory running LabVIEW software perform data acquisition, calculation, and report generation with a graphical user interface. Utilizing renewable energy sources requires environmental monitoring. Laboratory activities could include using transducers to measure wind speed and direction, solar radiation, and temperature.
- **Electromechanical controls laboratory** – This lab contains relay and pneumatic devices to connect industrial controls. It is also equipped with eight matched sets of AC and DC fractional horsepower machines and the test equipment necessary to analyze their performance. Stepper motors, servo motors, programmable logic controllers (PLC), relay logic trainers, transformers, rectifiers, synchronous machines, loading devices, and variable frequency drives are available and used for laboratory experiments.
- **Electronic fabrication laboratory** – This is a freshman skills lab covering a wide range of basic electronic fabrication techniques. It is equipped with a kick-shear, punch press, bending brake, drill presses, Pace solder stations, CNC rapid prototype machine, ultraviolet light table, and PCB developer and etching system. These facilities are also used to support development and fabrication activities for other course areas and student projects.
- **Energy systems and engine laboratory** – Students experience state-of-the-art equipment dealing with various types of engines, fuels, lubricants, and alternative energy issues in this lab. Systems include conventional flat panel solar heating, solar concentrators, solar-assisted heat pumps, co-generation and geothermal heat pumps. Real-time equipment performance data is used for simulation, modeling, and economic analysis.
- **General purpose laboratories** – Equipped with the latest Web, office, and programming software, this space is used for courses in programming, Web, database, and microcomputer applications. An academic license with Oracle allows students and faculty to access more than $750,000 worth of software.
- **HVAC&R (Heating, Ventilating, Air Conditioning and Refrigeration) laboratories** – This lab provides hands-on experience in the areas of heating, ventilating, air conditioning, refrigeration, fluid mechanics, heat transfer, and thermodynamics. These laboratories have been generously supported and upgraded through a large grant from a mechanical engineering technology alumnus and several American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) senior project grants.
- **Machine tool/manufacturing laboratory** – This lab is equipped with 20 manual style engine lathes, vertical and universal milling machines, drill presses, and radial drill presses. Here, students are introduced to traditional machining operations.
- **Engineering materials laboratory** – Students work with a 160,000-pound universal testing machine and other test equipment to examine tension, compression, buckling, impact, torsion, hardness, and fatigue. Metallographic preparation and computer-aided image processing are used to examine material structure. Heat-treating furnaces are also used to investigate the effects of thermal processing.
- **Fluid power laboratory** – This lab is used for both lower- and upper-division fluid power courses. Lab facilities include fully functional pneumatic and hydraulic system components. Students design and fabricate working fluid power circuits to reinforce topics covered in the classroom setting. Upper-division students use the hydraulic laboratory facilities to prepare for an optional industry certification offered at the end of the semester.
- **Mechanical design laboratory** – Equipped as a standard industrial research and development laboratory in the area of mechanical systems dynamics, this facility enables students to analyze rotational equipment, industrial power transmission devices, and various mechanical linkage designs. Using a "learn-by-doing" approach, students are able to apply the theoretical concepts conveyed during lecture to complete rigorous laboratory assignments.
- **Mechanisms laboratory** – This lab provides a true design environment that is supported by the latest software for drafting, solid modeling, product design, mechanism and system design, calculations, presentations, and analysis. Labs consist of either stand-alone desktop computers or student laptops.
- **Metrology & measurements laboratory** – This lab serves as a state-of-the-art "quality assurance" center and is anchored by new equipment recently donated by area companies. Facilities include a manual coordinate measurement machine donated by Helmel Engineering and a digital Starrett optical comparator and direct computer controlled coordinate measurement machine, both acquired through a grant from the Gleason Foundation.
- **Microelectronics laboratory** – This laboratory provides the student with a realistic experience in the semiconductor manufacturing processes. Oxidation, diffusion, photolithography, wet chemical etching, and vapor deposition equipment allow students the opportunity to design, build, and test simple solid-state devices on 100mm silicon wafers in a clean-room environment.
- **Microfabrication and semiconductor manufacturing facility** – This classroom includes a clean room for advanced device, microstructure and circuit development. The facility provides state-of-the-art instruments for designing, fabricating, characterizing and testing of complex micro-scale structures and devices in MicroElectroMechanical Systems (MEMS) and Microelectronics. The recent upgrade allows fabrication of very small MEMS devices such as sensors, actuators and microfluidic systems, and more advanced microelectronic components such as integrated circuits (ICs), transistors, capacitors, inductors, resistors, and diodes.
- **Multimedia laboratory** – This lab is equipped with the newest versions of Web development software, including Adobe Creative Suite 5 and the latest Microsoft Web applications.
- **Networking laboratories** – Two fully equipped networking laboratories are used to give students hands-on experience. The college has an academic license for VMware products so students, using the latest version of VMware Workstation, can run multiple guest operating system virtual machines on our powerful

lab computers, creating complex, layered virtual networks that can be directly connected to any of our lab network equipment. The labs are equipped with a blade server with 48 gigabytes of RAM and 12 terabyte storage array upon which VMware enterprise software is used to create a private cloud infrastructure where students can create and access virtual appliances. The college also has a Cisco Certified Academy, so our advanced networking lab contains a full complement of Cisco routers, switches, and wireless access points. Being a Cisco Academy allows our instructors to freely access all Cisco advanced networking software. Additionally, our advanced networking lab contains a full complement of network security equipment to include Cisco PIX firewalls, Cisco Adaptive Security firewalls, Juniper application firewalls, and Juniper SSL VPN concentrators.

- **Student project laboratory** – This space provides support for course projects and senior capstone design experience, secure storage for projects, and the necessary tools and support equipment.
- **Systems laboratory** – This lab is used for teaching microcomputer hardware and operating systems installation, upgrading, troubleshooting, and maintenance.

DEPARTMENT PROGRAMS

Computer Engineering Technology (AAS)
Computer Engineering Technology (BS)
Electrical Engineering Technology (AAS)
Electrical Engineering Technology (BS)
Engineering Science (AS)
Mechanical Engineering Technology (AAS)
Mechanical Engineering Technology (BS)