

Electro-Mechanical Engineering Technology - Energy Major (EMETE)

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Graduates of the program Electro-Mechanical Engineering Technology - Energy Major are prepared to address the needs of several related and growing industries related to energy efficiency and reduction of energy use in commercial and industrial applications.

Students work with building automation control technologies that provide data-driven services to help create high performance buildings with reduced costs, better indoor environments, and smaller environmental footprints.

Students also complete foundation studies in traditional electro-mechanical engineering technology.

Program graduates earn an Associate of Applied Science degree and are also prepared to pursue a bachelor's degree in fields such as electro-mechanical engineering technologies or electronics engineering technologies.

For more information, please contact the Center for Innovative Technologies at (513) 569-1743.

To apply for this program at Cincinnati State, visit the Admissions (<http://www.cincinnati.edu/academics/admission>) section of the College website.

Electro-Mechanical Engineering Technology—Energy Major (EMETE)

| Semester 1 | | Lec | Lab | Credits |
|------------|---|-----|-----|---------|
| EMET 150 | Introduction to Controls and Robotics (B) | 1 | 2 | 2 |
| CIT 105 | OSHA 10 General Industry Safety (B) | 1 | 0 | 1 |
| EET 131 | Circuit Analysis 1 (T) | 3 | 2 | 4 |
| PSET 110 | Power Systems Computer Aided Drafting (B) | 2 | 3 | 3 |
| FYE 1XX | First Year Experience Elective (B) | 1 | 0 | 1 |
| MAT XXX | Mathematics Elective 1 (G) | 3 | 2 | 4 |
| Semester 2 | | | | |
| EMET 180 | Process Instrumentation (T) | 2 | 3 | 3 |
| EET 132 | Circuit Analysis 2 (T) | 3 | 2 | 4 |
| ENG 101 | English Composition 1 (G) | 3 | 0 | 3 |

| MET 111 | Manufacturing Processes 1 (B) | 2 | 3 | 3 |
|----------------|--|----|-----|----|
| MAT XXX | Mathematics Elective 2 (B) | 3 | 2 | 4 |
| Semester 3 | | | | |
| XXX XXX | Cooperative Education or Transfer Elective 1 (T) | 1 | 40 | 2 |
| Semester 4 | | | | |
| EMET 210 | Energy Efficiency and Audits (T) | 2 | 2 | 3 |
| EMET 240 | Programmable Logic Controllers, Motors, Motor Controls, and Kinematics (T) | 2 | 3 | 3 |
| ENG 10X | English Composition Elective (G) | 3 | 0 | 3 |
| EMET 241 | Building Automation 1 (T) | 2 | 3 | 3 |
| PHY XXX | Physics Elective (G) | 3 | 2 | 4 |
| Semester 5 | | | | |
| EMET 225 | Solar and Renewable Energy (T) | 2 | 3 | 3 |
| MET 150 | Statics and Strength of Materials for MET (T) | 2 | 3 | 3 |
| EMET 242 | Building Automation 2 (T) | 3 | 3 | 4 |
| XXX XXX | Arts/ Humanities or Social/ Behavioral Science Elective (G) | 3 | 0 | 3 |
| Semester 6 | | | | |
| XXX XXX | Cooperative Education or Transfer Elective 2 (T) | 1 | 40 | 2 |
| Total Credits: | | 48 | 118 | 65 |

Electives

First Year Experience Elective

| | | |
|---------|------------------------------|---|
| FYE 100 | College Survival Skills | 1 |
| FYE 105 | College Success Strategies | 2 |
| FYE 110 | Community College Experience | 3 |

Mathematics Electives

Select one of the following series:

MAT 125 Algebra and Trigonometry & MAT 126 and Functions and Calculus

Or

MAT 251 Calculus 1 & MAT 252 and Calculus 2

English Composition Elective

| | | |
|--|--|---|
| ENG 102 | English Composition 2: Contemporary Issues | 3 |
| ENG 104 | English Composition 2: Technical Communication | 3 |
| Physics Elective | | |
| PHY 151 | Physics 1: Algebra and Trigonometry-Based | 4 |
| PHY 201 | Physics 1: Calculus-Based | 5 |
| Arts/Humanities or Social/Behavioral Science Elective (select one course) | | |
| Any ECO, GEO, HST, LBR, LIT, PHI | | 3 |
| Cooperative Education or Transfer Electives * | | |
| EMET 291 | Full-Time Cooperative Education 1: Electro-Mechanical Engineering Technology | 2 |
| EMET 292 | Full-Time Cooperative Education 2: Electro-Mechanical Engineering Technology | 2 |
| EET 121 | Digital Systems 1 | 3 |
| ESET 251 | Electronics | 4 |
| MET 140 | Engineering Materials | 3 |

* Program Chair approval is required for students planning to take a Transfer Elective course rather than participate in cooperative education.

The letters G, B, and T (displayed after course titles or elective descriptions) identify types of courses required by the Ohio Department of Higher Education as part of an associate's degree curriculum.

G = General Education course in this curriculum

B = Basic Skills course in this curriculum

T = Technical course in this curriculum

Electro-Mechanical Engineering Technologies (EMET, EMETE, EMETL)

- Demonstrate ability to communicate as an individual, as well as function effectively on teams by applying oral and written skills.
- Demonstrate knowledge of the importance of quality, timeliness, and continuous improvement.
- Demonstrate appropriate mastery of circuit analysis.
- Demonstrate appropriate mastery of CAD.
- Demonstrate ability to identify, analyze, and creatively solve technical and design problems.
- Demonstrate ability to apply fundamental knowledge to conduct experiments, analyze data, interpret data, and apply results to improve processes.
- Demonstrate appropriate mastery of programmable controllers and motor control systems.
- Demonstrate appropriate mastery of programming robots.
- Complete and pass an OSHA 10 General Industry course.

Faculty

Program Chair/Advisor

Professor Lawrence (Larry) Feist, BS
lawrence.feist@cincinnatiastate.edu

Co-op Coordinator

Professor Sue Dolan, M.Ed.
sue.dolan@cincinnatiastate.edu

Courses

EMET 115 Residential Lighting

3 Credits. 2 Lecture Hours. 2 Lab Hours.

A course on fundamentals of residential lighting. Topics include: safe use of tooling and ladders, removing and installing lamps, identifying commonly-used light fixtures and bulb types, and technician professional demeanor.

Prerequisites: AFL 085, and AFM 094 or MAT 120, or appropriate placement test scores

EMET 120 Residential Weatherization

3 Credits. 2 Lecture Hours. 2 Lab Hours.

A course on fundamental concepts related to the building envelope, or the structure and shell of a house. Topics include: insulation, windows and doors, HVAC systems, energy use of lighting and appliances, and weatherization terminology.

Prerequisites: AFL 085, and AFM 094 or MAT 120, or appropriate placement test scores

EMET 125 Commercial Lighting

3 Credits. 2 Lecture Hours. 2 Lab Hours.

A course on fundamentals of commercial lighting. Topics include: safe use of tooling, ladders, and lifts; removing and installing lamps for existing light fixtures (but not replacing the light fixture or ballast); auditing lamps; identifying light fixtures; removing fixture covers; and replacing lamps.

Prerequisites: AFL 085, and AFM 094 or MAT 120, or appropriate placement test scores

EMET 150 Introduction to Controls and Robotics

2 Credits. 1 Lecture Hour. 2 Lab Hours.

A course on operation and use of robots in manufacturing applications. Topics include: programmable robotics, flow charting, logic controllers, motors, control language, motion, and quality assurance.

Prerequisites: AFL 085, and AFM 094 or MAT 120, or appropriate placement test scores

EMET 180 Process Instrumentation

3 Credits. 2 Lecture Hours. 3 Lab Hours.

A course on process instrumentation theory and applications. Topics include: principles and practices of measurement and control of temperature, pressure, flow, level, and analytical quantities; and data acquisition for process instruments and controls.

Prerequisites: EMET 140 and EET 131 (minimum grade C for both)

EMET 191 Part-Time Cooperative Education 1: Electro-Mechanical Engineering Technology

1 Credit. 1 Lecture Hour. 20 Lab Hours.

Students seeking an associate's degree participate in their first part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: None

EMET 192 Part-Time Cooperative Education 2: Electro-Mechanical Engineering Technology**1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their second part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EMET 191

EMET 193 Part-Time Cooperative Education 3: Electro-Mechanical Engineering Technology**1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their third part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EMET 192

EMET 194 Part-Time Cooperative Education 4: Electro-Mechanical Engineering Technology**1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their fourth part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EMET 193

EMET 195 Part-Time Cooperative Education 5: Electro-Mechanical Engineering Technology**1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their fifth part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EMET 194

EMET 196 Part-Time Cooperative Education 6: Electro-Mechanical Engineering Technology**1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their sixth part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EMET 195

EMET 198 First Year Special Topics in Electro-Mechanical Engineering Technology**1-9 Credits. 0 Lecture Hour. 0 Lab Hour.**

A course on selected topics related to Electro-Mechanical Engineering Technology, which gives students opportunities to study information not currently covered in other courses. Grades issued are A, B, C, D, or F.

Prerequisites: Instructor Approval

EMET 199 First Year Independent Project in Electro-Mechanical Engineering Technology**1-9 Credits. 0 Lecture Hour. 0 Lab Hour.**

A project related to Electro-Mechanical Engineering Technology that is completed by one or more students to meet specific educational goals. Projects must have prior approval and supervision by Electro-Mechanical Engineering Technology faculty. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: Instructor Approval

EMET 210 Energy Efficiency and Audits**3 Credits. 2 Lecture Hours. 2 Lab Hours.**

A course on concepts related to energy consumption. Topics include: conducting energy audits for residential, commercial, and industrial locations; conserving energy; reducing energy consumption; and applying renewable energies.

Prerequisites: None

EMET 225 Solar and Renewable Energy**3 Credits. 2 Lecture Hours. 3 Lab Hours.**

A course on planning, installing, and maintaining solar and renewable energy devices. Topics include: photovoltaic electrical systems, solar thermal systems, fuel cell technology, and wind turbine technology.

Prerequisites: EMET 210 (minimum grade C)

EMET 230 Fuel Cells and Wind Devices**3 Credits. 2 Lecture Hours. 2 Lab Hours.**

A course on planning, installing, and maintaining alternative energy sources. Topics include: converting chemical energy to electricity; fuel cell components, power efficiencies, and applications; electrolysis; and wind turbine components.

Prerequisites: EMET 210

EMET 240 Programmable Logic Controllers, Motors, Motor Controls, and Kinematics**3 Credits. 2 Lecture Hours. 3 Lab Hours.**

A course on programmable logic controllers, motors, and variable speed drives and mechanisms. Topics include: operating, troubleshooting, and controlling circuits; calculating speed, torque, horsepower, and efficiency; and machine kinematics.

Prerequisites: EET 132 (minimum grade C)

EMET 241 Building Automation 1**3 Credits. 2 Lecture Hours. 3 Lab Hours.**

A course on fundamentals of building automation systems and commercial HVAC/R systems. Topics include: system components, building automation and control theory, psychometrics, air and water systems, boilers, chillers, lighting, thermostats, pumps, PLC, and motor controls.

Prerequisites: EET 132

Corequisites: EMET 240

Instructor Consent Required

EMET 242 Building Automation 2**4 Credits. 3 Lecture Hours. 3 Lab Hours.**

A continuation of EMET 241. Topics include: control methods, HVAC scheduling, alarm categories and data logs, control of building HVAC mechanical systems, network fundamentals, OSI model, IP protocol, network signal transmission and protocols, and controller programming.

Prerequisites: EMET 241

EMET 245 Laser 1**3 Credits. 2 Lecture Hours. 3 Lab Hours.**

A course on the operational theory and safe use of lasers. Topics include: properties of laser light, elements of the laser, laser classifications, structure of the eye, and hazards associated with laser light.

Prerequisites: EMET 150 (minimum grade C) and MAT 121 (minimum grade C) or appropriate placement test score

EMET 246 Laser 2**4 Credits. 3 Lecture Hours. 3 Lab Hours.**

A continuation of EMET 245, covering optical elements and types of industrial lasers used in photonics applications. Topics include: lenses, mirrors, prisms, laser modulators and Q-switches, optical power, energy measurements, and applying lasers for advanced manufacturing.

Prerequisites: EMET 245 (minimum grade C)

EMET 270 Robotics and Servomechanisms**4 Credits. 3 Lecture Hours. 3 Lab Hours.**

A course on theory and applications of robotics and servomechanisms. Topics include: analyzing industrial robotics applications in automated manufacturing environments; programming and operating robots; transducers, proportional, proportional-integral, and proportional-integral-derivative positional control systems; and closed-loop controls.

Prerequisites: EET 132 (minimum grade C)

EMET 275 Electric Drive Mechanisms**4 Credits. 3 Lecture Hours. 3 Lab Hours.**

A course on electric drive systems used in electric vehicles and stationary power systems. Topics include: power and energy measurement, energy storage, battery monitoring, motor drives, control electronics and instrumentation, power transmission, and electrical safety devices.

Prerequisites: EMET 240 (minimum grade C)

EMET 291 Full-Time Cooperative Education 1: Electro-Mechanical Engineering Technology**2 Credits. 1 Lecture Hour. 40 Lab Hours.**

Students seeking an associate's degree participate in their first full-time field learning experience related to their degree. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: None

EMET 292 Full-Time Cooperative Education 2: Electro-Mechanical Engineering Technology**2 Credits. 1 Lecture Hour. 40 Lab Hours.**

Students seeking an associate's degree participate in their second full-time field learning experience related to their degree. Students must follow cooperative education policies and procedures to earn credit.

Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EMET 291

EMET 293 Full-Time Cooperative Education 3: Electro-Mechanical Engineering Technology**2 Credits. 1 Lecture Hour. 40 Lab Hours.**

Students seeking an associate's degree participate in their third full-time field learning experience related to their degree. Students must follow cooperative education policies and procedures to earn credit.

Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EMET 292

EMET 294 Internship 1: Electro-Mechanical Engineering Technology**2 Credits. 1 Lecture Hour. 40 Lab Hours.**

Students seeking an associate's degree participate in their first unpaid field learning experience related to their degree. Students must follow applicable policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EMET 140

EMET 295 Internship 2: Electro-Mechanical Engineering Technology**2 Credits. 1 Lecture Hour. 40 Lab Hours.**

Students seeking an associate's degree participate in their second unpaid field learning experience related to their degree. Students must follow applicable policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EMET 294

EMET 298 Second Year Special Topics in Electro-Mechanical Engineering Technology**1-9 Credits. 0 Lecture Hour. 0 Lab Hour.**

A course on selected topics related to Electro-Mechanical Engineering Technology, which gives students opportunities to study information not currently covered in other courses. Grades issued are A, B, C, D, or F.

Prerequisites: Instructor Approval

EMET 299 Second Year Independent Project in Electro-Mechanical Engineering Technology**1-9 Credits. 0 Lecture Hour. 0 Lab Hour.**

A project related to Electro-Mechanical Engineering Technology that is completed by one or more students to meet specific educational goals. Projects must have prior approval and supervision by Electro-Mechanical Engineering Technology faculty. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: Instructor Approval