

# Electro-Mechanical Engineering Technology - Energy Major (EMETE)

## Electro-Mechanical Engineering Technology - Energy Major (EMETE)

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 Engineering and Information Technologies Division 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 ( B)	3	2	4
FYE 1XX	First Year Experience Elective ( B)	1	0	1
EMET 110	Computer Aided Design for Electro-Mechanical Systems ( B)	2	3	3
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
MAT XXX	Mathematics Elective 2 ( B)	3	2	4
EMET 141	Programmable Logic Controllers ( T)	2	3	3
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
ENG 10X	English Composition Elective ( G)	3	0	3
EMET 252	Motors, Motor Controls, and Variable Drives ( T)	2	3	3
PHY XXX	Physics Elective ( G)	3	2	4
Semester 5				
EMET 225	Solar and Renewable Energy ( T)	2	3	3
XXX XXX	Arts/ Humanities or Social/ Behavioral Science Elective ( G)	3	0	3
EMET 241	Building Automation 1 ( T)	2	3	3
MET XXX	Elective ( T)	2	3	3
Semester 6				
XXX XXX	Cooperative Education or Transfer Elective 2 ( T)	1	40	2
<b>Total Credits:</b>		<b>45</b>	<b>115</b>	<b>61</b>

## Electives

### First Year Experience Elective

FYE 100	College Success Strategies: Overview	1
FYE 105	College Success Strategies: Overview and Application	2
FYE 110	College Success Strategies: Practice and Application	3

### Mathematics Electives

Select one of the following series:

MAT 125 & MAT 126	Algebra and Trigonometry and Functions and Calculus	8
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Or		
MAT 251 & MAT 252	Calculus 1 and Calculus 2	
<b>English Composition Elective</b>		
ENG 102	English Composition 2: Contemporary Issues	3
ENG 104	English Composition 2: Technical Communication	3
<b>Physics Elective</b>		
PHY 151	Physics 1: Algebra and Trigonometry-Based	4
PHY 201	Physics 1: Calculus-Based	5
<b>Arts/Humanities or Social/Behavioral Science Elective (select one course)</b>		
Any ECO, GEO, HST, LBR, LIT, PHI		3
<b>MET Elective</b>		
MET 111	Manufacturing Processes 1	3
MET 150	Statics and Strength of Materials for MET	3
<b>Cooperative Education or Transfer Electives *</b>		
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
CIT 250	Engineering Community	2

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

Some courses are offered in alternative versions identified with a letter after the course number-- for example, ENG 101 and ENG 101A.

- This curriculum displays only course numbers without the added letter.
- The alternative version, when available, meets the requirements of the course version without the added letter.

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)

- The student will demonstrate an appropriate mastery of circuit analysis.
- The student will demonstrate an appropriate mastery of CAD.
- The student will demonstrate an ability to identify, analyze, and creatively solve technical and design problems.

- The student will demonstrate an appropriate mastery of programmable controllers.
- The student will demonstrate an appropriate mastery of motor control systems.
- The student will demonstrate an appropriate mastery of programming robots.
- The student must complete and pass an OSHA 10 General Industry course.

## Faculty

### Program Chair/Advisor

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

### Co-op Coordinator

Doug Woodruff, MBA  
doug.woodruff@cincinnatiatstate.edu

## Engineering and Information Technologies Division Advising

(513) 569-1743

## Courses

### EMET 110 Computer Aided Design for Electro-Mechanical Systems

**3 Credits. 2 Lecture Hours. 3 Lab Hours.**

A course on fundamentals of computer-aided drafting (CAD) and design for electro-mechanical systems, including techniques for generating accurate engineering drawings and 3D models.  
Prerequisites: MAT 096 or MAT 124, or appropriate placement

### EMET 141 Programmable Logic Controllers

**3 Credits. 2 Lecture Hours. 3 Lab Hours.**

A course on fundamentals of using programmable logic controllers (PLC). Topics include: PLC applications, ladder logic programming, processor selection and configuration, digital and analog input and output wiring, and human-machine interface (HMI) concepts.  
Prerequisites: EET 131 and EMET 150 and MAT 125 or appropriate placement (minimum grade C for all)

### 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: Placement into ENG 101A, and MAT 096 or MAT 124 or appropriate Math placement

### 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 150 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 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

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 124 (minimum grade C) or appropriate placement

**EMET 246 Laser 2**

**3 Credits. 2 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 252 Motors, Motor Controls, and Variable Drives**

**3 Credits. 2 Lecture Hours. 3 Lab Hours.**

A course on DC and AC motors and motor control circuits and devices including the Variable Frequency Drive (VFD). Topics include: brushed and brushless motors and generators, Pulse Width Modulation (PWM), variable speed drives, speed/torque/power characteristics, industrial control circuits, electrical safety, and troubleshooting.

Prerequisites: EET 132 and EMET 141 and EMET 150 (minimum grade C for all)

**EMET 270 Robotics and Servomechanisms**

**3 Credits. 2 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**

**3 Credits. 2 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 180 and EMET 252 (minimum grade C for both)

**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