Electro-Mechanical Engineering Technology - Laser Major and Laser Certificate (EMETL, EMETLC)

Electro-Mechanical Engineering Technology—Laser Major (EMETL)

Graduates of the Electro-Mechanical Engineering Technology - Laser Major are prepared to successfully begin careers and advance professionally in local and national industries that utilize lasers and electro-optics systems, or use industrial equipment in automated manufacturing and research environments.

Students work with laser material processing systems, and operate and troubleshoot optical systems including lasers, lens systems, and fiber optics.

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 or electrical engineering.

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.cincinnatistate.edu/academics/admission) section of the College website.

Electro-Mechanical Engineering Technology—Laser Certificate (EMETLC)

The Electro-Mechanical Engineering Technology – Laser Certificate prepares students to enter careers and advance professionally in local and national industries that utilize laser and electro-optics systems. Students work with laser material processing systems, and operate and troubleshoot optical systems including laser, lens systems, and fiber optics.

Graduates of the certificate program receive OSHA 10 Electrical Safe Practices certification and are prepared for Laser Safety Officer training based on ANSI 36 standards, OSHA guidelines, and the FDA Center for Devices and Radiological Health (CDRH).

The Laser Certificate is for professionals and students enrolled in or who have graduated from an associate degree or bachelor's degree program in Electro-Mechanical, Electrical, or similarly-titled Engineering Technology programs.

For more information, please contact the Engineering and Information Technologies Division at (513) 569-1743.

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Electro-Mechanical Engineering Technology—Laser Major (EMETL)

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
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
MET 150	Statics and Strength of Materials for MET (**B**)	2	3	3
Semester 4				
EMET 245	Laser 1 (**T**)	2	3	3
EMET 252	Motors, Motor Controls, and Variable Drives (**T**)	2	3	3
PHY XXX Physics Elective (**G**)		3	2	4
ENG 10X English Composition Elective (**G**)		3	0	3
Semester 5				
EMET 246	Laser 2 (**T**)	2	3	3
EMET 270	Robotics and Servomechanisms (**T**)	2	3	3

XXX XXX Arts/ Humanities or Social/ Behavioral Science Elective (**G**)		3	0	3
MET 240	Hydraulics and Pneumatics (**T**)	2	3	3
Semester 6				
XXX XXX Cooperative Education or Transfer Elective 2 (**T**)		1	40	2
Total Credits:		**47**	**119**	**64**

Electives

First Year Experience Elective		
FYE 100	Essentials for College Success	1
FYE 105	Skills for College and Personal Success	2
FYE 110	Intensive College Success Strategies	3
Mathematics Electives		**8**
Select one of the following series:		
MAT 125 & MAT 126	Algebra and Trigonometry and Functions and Calculus	
Or		
MAT 251 & MAT 252	Calculus 1 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		
Any ECO, GEO, HST, LBR, LIT, PHI		
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
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 Technology - Laser Certificate (EMETLC)

Semester 1		**Lec**	**Lab**	**Credits**
EMET 245	Laser 1	2	3	3
CIT 105	OSHA 10 General Industry Safety	1	0	1
Semester 2				
EMET 246	Laser 2	2	3	3
Total Credits:		**5**	**6**	**7**

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.

Electro-Mechanical Engineering Technologies (EMET, EMETB, 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.

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