

# Engineering Technology- Bachelor of Science in Applied Science

For more information please contact the Department of Engineering Technology in room 207 Phelps Hall, Hamilton campus, or by phone 513-785-1804.

This department offers Associate Degree programs in Electrical and Computer Engineering Technology and Mechanical Engineering Technology and baccalaureate completion degree programs. All programs are offered on the regional campuses in Hamilton and Middletown. The baccalaureate programs are only for students who have earned an associate degree. The associate degree programs are described in the Hamilton and Middletown chapter.

## Educational Objectives

We consider program educational objectives as the general characteristics our graduates demonstrate to the workplace, graduate school, the military, or their endeavors after they leave Miami. We typically measure these characteristics initially at graduation by asking graduates if they feel that they have achieved these characteristics and then periodically thereafter through employer surveys, letters from graduates, advisory council, graduate school accomplishments, and surveys of graduates who have been out for a while. These characteristics should become most evident within the first few years after graduation.

The Engineering Technology Department's graduates are able to:

- apply math and physics principles to the solution of engineering technical problems.
- use applied skills to identify, evaluate, and solve complex technical problems.
- use engineering computer software to facilitate engineering problem solving.
- function effectively in team-oriented activities.
- demonstrate the knowledge of expected standards of ethical and professional conduct.
- verbally communicate ideas.
- prepare well-written technical reports.

In addition, our graduates will have the necessary fundamentals to pursue life-long learning.

## Program-Specific Educational Objectives

### Electrical and Computer Engineering Technology (B.S.)

The ECET BS concentration produces graduates who:

- Are able to analyze and design complex electrical and computer components and systems.
- Are able to effectively and efficiently manage electrical and computer engineering projects.

- Are able to set-up experimental testing procedures and selectively utilize data to reinforce electrical and computer engineering concepts.

### Electro-Mechanical Engineering Technology (B.S. Completion Program)

The EMET program produces graduates who:

- possess the ability to apply theoretical knowledge to solve engineering technology problems associated with instrumentation and control systems.
- are knowledgeable of modern applications in process control systems.

### Mechanical Engineering Technology (B.S.)

The MET program produces graduates who:

- are able to analyze and design complex mechanical components and systems.
- are able to set up experimental testing procedures and selectively utilize data to reinforce engineering concepts.
- have a basic understanding of modern manufacturing methods used to facilitate the production of consumer products.
- are able to effectively and efficiently manage engineering projects (B.S. only).

### Robotics Engineering Technology (B.S. Completion Program)

- possess the ability to apply theoretical knowledge to solve engineering technology problems associated with robotics and automation systems.
- are able to analyze and design complex robotics systems and components.
- possess the ability to integrate mechanical, electrical and computer science skills to design and integrate robot platforms for solving real world industrial applications of robotics.
- are able to use communication skills in oral, written, visual and graphic modes within interpersonal, team, and group environments.

## Credit/No Credit Policy

All required engineering technology courses and prerequisite mathematics and statistics courses should be taken for a grade.

## Program Requirements

(124 semester hours)

### Electrical and Computer Concentration

The Engineering Technology baccalaureate degree (Electrical and Computer concentration) is a completion program for graduates of associate degree programs in electrical/electronics, electrical and computer, or similar engineering technology programs and for computer information technology or similar programs. The objective of this program is to allow students who possess an associate degree in these areas to complete the bachelor's degree in approximately the equivalent of two years of full-time work.

Graduates are engineers prepared to fill industrial positions in areas directly related to product design, process control, testing,

manufacturing, sales, and service. Typical Electrical and Computer Engineering jobs include Communications Engineering, Electronics Engineering, Biomedical Engineering, Sales Engineering, Service Engineering, Controls Engineering, Software Engineering, System Design Engineering, Applications Engineering and R&D Technologist.

This program requires the completion of an Associate Degree from an accredited college or university in Electrical/Electronic, Electrical and Computer, or similar engineering technology program; or computer information technology or similar program.

- The following General Education and Technical courses are expected to have been taken within the Associate Degree's with a minimum of 60 semester hours.
- If an equivalent to any of these courses has not been completed already, they must be taken at Miami University to bridge the Associate Degree and Bachelor completion.

Code	Title	Credit Hours
<b>Foundation Requirements (60 semester hours minimum)</b>		
General Education Courses from Associate Degree or as a Bridge to a Bachelor's Completion.		
ECO 201	Principles of Microeconomics	
or ECO 202	Principles of Macroeconomics	
ENG 111	Composition and Rhetoric	
EGS 215	Workplace Writing	
or ENG 313	Technical Writing	
MTH 151	Calculus I	
PHY 161	Physics for the Life Sciences with Laboratory I	
or PHY 191		
PHY 162	Physics for the Life Sciences with Laboratory II	
or PHY 192		
STC 135	Principles of Public Speaking	
or STC 136	Introduction to Interpersonal Communication	
Technical Courses from Associate Degree or as a Bridge to a Bachelor's Completion		
CSE 163	Introduction to Computer Concepts and Programming	
or CSE 153	Introduction to C/C++ Programming	
ENT 192	Circuit Analysis I	
ENT 193	Circuit Analysis II	
ENT 196	Electronics	
ENT 293	Digital Systems	
ENT 294	Local Area Networks	
ENT 295	Microprocessor Technology I	

#### Program Course Requirements

General Education Requirements

If Associate Degree is from Miami:

Global Citizenship Perspectives Area 4 Elective (Diversity, Equity, & Inclusion)	3
Arts and Humanities Perspective Area 3 Elective	3
Global Citizenship Perspectives Area 4 Elective (Global Inquiry)	3

If Associate Degree is not from Miami:

Ohio Transfer 36

OR

Miami Plan Completion

Engineering Technology Requirements

CHM 141	College Chemistry	3
CHM 144	College Chemistry Laboratory	2
ENT 271	Mechanics I: Statics	3
ENT 301	Dynamics	3
ENT 302	Fundamentals of Signals and Systems	3
ENT 303	Digital Signal Processing Technology	3
ENT 311	Process Control Interface Design	3
ENT 316	Project Management	3
ENT 387	Embedded Systems Technology	3
ENT 401	Computerized Instrumentation	3
ENT 402	Industrial Automation Lab	3
ENT 403	Wireless Communication and Networks	3
ENT 418	Electro-Mechanical Control Systems	3
ENT 497	Senior Design Project	2
ENT 498	Senior Design Project	2
MTH 222	Introduction to Linear Algebra	3
MTH 251	Calculus II	4
MTH 245	Differential Equations for Engineers	3
STA 301	Applied Statistics	3
or STA 261	Statistics	

Global Citizenship Perspectives Area 4 Elective - (Intercultural Consciousness or Global Inquiry ) 3

General Education Courses from Associate Degree or as a Bridge to a Bachelor's Completion.

**Total Credit Hours 127**

## Electro-Mechanical Engineering Technology (B.S. Completion Program)

The EMET program produces graduates who:

- possess the ability to apply theoretical knowledge to solve engineering technology problems associated with instrumentation and control systems.
- are knowledgeable of modern applications in process control systems.

**The Electro-Mechanical Concentration is an** Engineering Technology baccalaureate degree completion program for graduates of associate degree programs in electrical/electronics, mechanical, electro-mechanical or similar engineering technology programs. The objective of this program is to allow students who possess an associate degree in these areas to complete the bachelor degree in approximately the equivalent of two years of full-time work (64-70 semester hours). This program is accredited by the Engineering Technology Accreditation Commission of ABET (111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone, 410-347-7700, <http://www.abet.org/>).

Graduates are engineers prepared to fill industrial positions in areas directly related to industrial automation, scientific programming, product design, process control, testing, manufacturing, sales,

and service. Typical Electro-Mechanical Engineering duties may include working in teams involved with product analysis/design, instrumentation and control, CAD/CAM product design, laboratory testing services, product sales and service, product application, and the design of systems that require a hardware/software interface.

This program requires the completion of an Associate Degree from an accredited college or university in Electrical, Mechanical, Electro-Mechanical or similar engineering technology program.

Code	Title	Credit Hours
<b>Foundation Requirements (60 semester hours minimum)</b>		
General Education Courses from Associate Degree or as a Bridge to a Bachelor's Completion.		
ECO 201 or ECO 202	Principles of Microeconomics Principles of Macroeconomics	
ENG 111	Composition and Rhetoric	
EGS 215 or ENG 313	Workplace Writing Technical Writing	
MTH 151	Calculus I	
STC 135 or STC 136	Principles of Public Speaking Introduction to Interpersonal Communication	
Select one of the following:		
PHY 161 or PHY 191	Physics for the Life Sciences with Laboratory I or PHY 191	
PHY 162 or PHY 192	Physics for the Life Sciences with Laboratory II or PHY 192	

Technical Courses from Associate Degree or as a Bridge to a Bachelor's Completion.

CSE 153 or CSE 163	Introduction to C/C++ Programming Introduction to Computer Concepts and Programming	
ENT 135	Computer-Aided Drafting	
ENT 151	Engineering Materials	
ENT 192	Circuit Analysis I	
ENT 193	Circuit Analysis II	
ENT 196	Electronics	
ENT 271	Mechanics I: Statics	
ENT 272	Mechanics II: Strength of Materials	
ENT 293	Digital Systems	

#### Program Course Requirements

General Education Requirements		
If Associate Degree is from Miami:		
Arts and Humanities Perspective Area 3 Elective		3
Global Citizenship Perspectives Area 4 Elective (Diversity, Equity, & Inclusion)		3
Global Citizenship Perspectives Area 4 Elective (Global Inquiry)		3
If Associate Degree is not from Miami:		
Ohio Transfer 36		
OR		
Miami Plan Completion		

#### Engineering Technology Requirements <sup>1</sup>

CHM 141	College Chemistry	3
CHM 144	College Chemistry Laboratory	2
ENT 301	Dynamics	3
ENT 310	Fluid Mechanics	3
ENT 311	Process Control Interface Design	3
ENT 316	Project Management	3
ENT 401	Computerized Instrumentation	3
ENT 402	Industrial Automation Lab	3
ENT 407	Modern Manufacturing Systems	3
ENT 418	Electro-Mechanical Control Systems	3
ENT 497	Senior Design Project	2
ENT 498	Senior Design Project	2
MTH 251	Calculus II	4
MTH 245	Differential Equations for Engineers	3
STA 301 or STA 261	Applied Statistics Statistics	3
Additional Bridge Courses <sup>2</sup>		9
Global Citizenship Perspectives Area 4 (Intercultural Consciousness or Global Inquiry) Elective		3
<b>Total Credit Hours</b>		<b>124</b>

<sup>1</sup> This electro-mechanical concentration of courses provides depth in mechanical, electrical, and software integration necessary for automation.

<sup>2</sup> Students with an Associate Degree in Electrical and Computer Engineering Technology, or similar program, must take ENT 151, ENT 271, and ENT 272. Students with an Associate Degree in Mechanical Engineering Technology, or similar program, must take ENT 193, ENT 196, and ENT 293.

## Mechanical Engineering Technology Concentration

The Engineering Technology baccalaureate degree (Mechanical Engineering Technology concentration) is a completion program for graduates of associate degree programs in mechanical engineering technology. The objective of this program is to allow students who possess an associate degree in this area to complete the bachelor degree in approximately the equivalent of two years of full-time work (64-70 semester hours). This program is accredited by the Engineering Technology Accreditation Commission of ABET (111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone, 410-347-7700, <http://www.abet.org/>).

Mechanical Engineering Technology focuses on the applied aspects of mechanical and thermal-fluidid analysis of the components in mechanisms, machines, products, and systems. The program requires a thorough understanding of applied mathematics and the engineering sciences. Students will develop the essential skills needed to apply experimental and empirical techniques to the study of systems and the solution of problems. This knowledge is used to research concepts, apply modeling methods, simulate and test operating conditions and their impact on the designed systems, and synthesize different elements to obtain an optimum design of a specific product.

Industry is in need of qualified mechanical engineers who are familiar with measurement and test techniques in mechanical engineering, Computer Aided Engineering (CAE) including finite element analysis (FEA), computer-aided design (CAD), and analysis and the concepts of advanced mechanical design to the creation of sophisticated machines and systems.

The mechanical engineering technology concentration provides depth of study in mechanical and manufacturing engineering technology built on a solid foundation of mathematics, physics, and computer science. The program also provides breadth through required studies in economics, humanities, social science, global perspectives, and liberal arts.

Graduates will find employment opportunities in a diverse spectrum of professional fields. Many mechanical engineers work on team projects within manufacturing-related areas such as testing, analysis, design, and the development of products. Graduates may also continue their education at graduate engineering technology/ engineering levels.

This program requires the completion of an Associate Degree from an accredited college or university in Mechanical Engineering Technology, or similar engineering technology program.

- The following General Education and Technical courses are expected to have been taken within the Associate Degree's minimum 60 semester hours.
- If an equivalent to any of these courses has not been completed already, they must be taken at Miami University to bridge the Associate Degree and Bachelor completion.

Code	Title	Credit Hours	
<b>Foundation Requirements (60 semester hours minimum)</b>			
ECO 201 or ECO 202	Principles of Microeconomics Principles of Macroeconomics	<b>60</b>	
ENG 111	Composition and Rhetoric		
EGS 215 or ENG 313	Workplace Writing Technical Writing		
MTH 151	Calculus I		
PHY 161 or PHY 191	Physics for the Life Sciences with Laboratory I Laboratory I		
STC 135 or STC 136	Principles of Public Speaking Introduction to Interpersonal Communication		
<b>Technical Courses from Associate Degree</b>			
CSE 163	Introduction to Computer Concepts and Programming		
ENT 135	Computer-Aided Drafting		
ENT 137	Introduction to Engineering Technology		
ENT 151	Engineering Materials		
ENT 152	Computer-Aided Manufacturing I		
ENT 192	Circuit Analysis I		
ENT 235	Computer-Aided Design		
ENT 252	Computer-Aided Manufacturing II		
ENT 271	Mechanics I: Statics		

ENT 272	Mechanics II: Strength of Materials	
ENT 278	Mechanics III: Analysis of Machine Components	
<b>Program Course Requirements</b>		
General Education Requirements		
If Associate Degree is from Miami:		
Arts and Humanities Perspective Area 3 Elective		3
Global Citizenship Perspectives Area 4 Elective (Diversity, Equity, & Inclusion)		3
Global Citizenship Perspectives Area 4 Elective (Global Inquiry)		3
If Associate Degree is not from Miami:		
Ohio Transfer	36	
OR		
Miami Plan Completion		
Engineering Technology Required Courses		
CHM 141	College Chemistry	3
CHM 144	College Chemistry Laboratory	2
ENT 301	Dynamics	3
ENT 310	Fluid Mechanics	3
ENT 312	Thermodynamics and Heat Power	3
ENT 314	Mechanisms for Machine Design	3
ENT 316	Project Management	3
ENT 355	Introduction to Finite Element Analysis	3
ENT 404	Experimentation Techniques	3
ENT 415	Heat Transfer with Applications	3
ENT 478	Product Development in Engineering	3
ENT 497	Senior Design Project	2
ENT 498	Senior Design Project	2
MTH 245	Differential Equations for Engineers	3
MTH 251	Calculus II	4
PHY 162 or PHY 192	Physics for the Life Sciences with Laboratory II Laboratory II	4-5
STA 301 or STA 261	Applied Statistics Statistics	3-4
Select one of the following:		3
MTH 124	Trigonometry	
MTH 222	Introduction to Linear Algebra	
MTH 231	Elements of Discrete Mathematics	
Global Citizenship Perspectives Area 4 (Intercultural Consciousness or Global Inquiry)		3
<b>Total Credit Hours</b>		<b>125-127</b>

## Robotics Engineering Technology (B.S. Completion Program)

The Robotics Engineering Technology Concentration is an Engineering Technology baccalaureate degree completion program for graduates of associate degree programs in electrical/electronics, mechanical, electro-mechanical or similar engineering technology programs. The objective of this program is to allow students who possess an associate degree in these areas to complete the bachelor's degree

in approximately the equivalent of two years of full-time coursework (64-70 semester hours).

Due to the multidisciplinary nature of their background, graduates of the program have the necessary skills to design or manage systems resulting from the integration of diverse components and technologies. Engineers working in this field design solutions to address problems in areas such as factory automation, building automation, and motion control and robotics. Graduates are engineers prepared to fill industrial positions in areas directly related to design and development of robotics systems and robot platforms, robotics systems engineering, Factory automation, Building Automation, product design, Motion control and robotics, sales, and service.

This program requires the completion of an Associate Degree from an accredited college or university in Electrical, Mechanical, Electro-Mechanical, Robotics or similar engineering technology program.

Code	Title	Credit Hours
<b>Foundation Requirements (60 semester hours minimum)</b>		
ECO 201 or ECO 202	Principles of Microeconomics Principles of Macroeconomics	60
ENG 111	Composition and Rhetoric	
EGS 215 or ENG 313	Workplace Writing Technical Writing	
MTH 151	Calculus I	
STC 135 or STC 136	Principles of Public Speaking Introduction to Interpersonal Communication	
PHY 161 or PHY 191	Physics for the Life Sciences with Laboratory I	
PHY 162 or PHY 192	Physics for the Life Sciences with Laboratory II	

Technical Courses from Associate Degree or as a Bridge to a Bachelor's Completion.

CSE 153 or CSE 163	Introduction to C/C++ Programming Introduction to Computer Concepts and Programming
ENT 135	Computer-Aided Drafting
ENT 192	Circuit Analysis I
ENT 193	Circuit Analysis II
ENT 196	Electronics
ENT 271	Mechanics I: Statics
ENT 272	Mechanics II: Strength of Materials
ENT 293	Digital Systems

**Program Course Requirements**

General Education Requirements

If Associate Degree is from Miami:

Arts and Humanities Perspective Area 3 Elective	3
Global Citizenship Perspectives Area 4 Elective (Diversity, Equity, & Inclusion)	3
Global Citizenship Perspectives Area 4 Elective (Global Inquiry)	3

If Associate Degree is not from Miami:		
Ohio Transfer 36		
OR		
Miami Plan Completion		
Engineering Technology Requirements		
CHM 141 & CHM 144	College Chemistry and College Chemistry Laboratory	5
ENT 296	Programmable Logic Controllers	3
ENT 301	Dynamics	3
ENT 311	Process Control Interface Design	3
ENT 313	Introduction to Robotics Systems	3
ENT 316	Project Management	3
ENT 401	Computerized Instrumentation	3
ENT 413	Industrial Robotics Lab	3
ENT 417	Integrated Robotics Systems Engineering	3
ENT 418	Electro-Mechanical Control Systems	3
ENT 497	Senior Design Project	2
ENT 498	Senior Design Project	2
MTH 251	Calculus II	4
MTH 245	Differential Equations for Engineers	3
STA 301 or STA 261	Applied Statistics Statistics	3
Global Citizenship Perspectives Area 4 (Intercultural Consciousness or Global Inquiry)		3
Additional Bridge Courses (Technical Electives Transferred from Associate Degree)		6
<b>Total Credit Hours</b>		<b>124</b>