

# ELECTRO-MECHANICAL ENGINEERING TECHNOLOGY, B.S. (ENGINEERING)

**Begin Campus:** Any Penn State Campus

**End Campus:** Fayette, New Kensington, York

## Program Description

The Electro-Mechanical Engineering Technology (B.S. EMET) degree program provides the basic undergraduate education required for a career as an electro-mechanical engineering technologist. The program emphasizes a breadth of knowledge in all fields of engineering technology related to typical, highly-automated manufacturing, production, or assembly plant processes. Basic coverage is provided in all major areas to technology involved in the operation and control of manufacturing and production processes, including instrumentation and monitoring methods, principles of machine design, automated control techniques, thermal and fluid sciences, computerized manufacturing systems, principles of electrical and electronic circuit operation, computer-aided drafting and design, economics of production, and statistical analysis and quality control.

The primary aim of the EMET program is to provide graduates with the knowledge and skills necessary to apply current methods and technology to the development, design, operation, and management of electro-mechanical systems, particularly in those industries where automated systems are prevalent.

The major is organized as a four-year baccalaureate program with the corresponding Penn State admission requirements. Graduates of an associate degree in either electrical or mechanical engineering technology from Penn State may re-enroll in the EMET program. The College of Engineering ENGR students may enroll through "Change of Major" procedures. Students from an engineering technology program at another institution or community college accredited by ETAC of ABET may transfer into the program with advanced standing.

## What is Electro-Mechanical Engineering?

The Bachelor of Science degree in Electro-Mechanical Engineering Technology responds to a growing demand for engineers with a broad range of technical skills. The program emphasizes knowledge in the field of technology related to the design, maintenance, and operation of electromechanical systems, essentially automation and robotics. These systems incorporate electronic, mechanical, instrumentation and control elements. The program provides students with hands-on experience with these elements, technical knowledge, and the soft skills needed to be successful in the field of engineering. In this curriculum, students receive early exposure to technology by scheduling technical courses in the major. A laboratory component that promotes the understanding of the subject matter through the experiential application of theory accompanies most technical courses. This program culminates with a senior capstone project in which students work together in a team to design and implement an engineering project from initial proposal through product demonstration.

## You Might Like This Program If...

You are interested in math and science but prefer spending time applying your skills in a laboratory or field setting as opposed to studying the theory behind these subjects in a classroom setting. If you like to take things apart, to see how they work, this may be for you. There is a greater emphasis on engineering applications while building an understanding of scientific theory.

## Direct Admission to the Major

Incoming first-year students who meet the program admission requirements are admitted directly into the major. Admission restrictions may apply for change-of-major and/or change-of-campus students.

For more information about the admission process for this major, please send a request to the college, campus, or program contact (listed in the Contact tab).

## Degree Requirements

**For the Bachelor of Science degree in Electro-Mechanical Engineering Technology, a minimum of 130 credits is required:**

Requirement	Credits
General Education	45
Requirements for the Major	109-114

**24 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 6 credits of GQ courses; 9 credits of GN courses; 6 credits of GWS courses; 3 credits of GH or GS courses.**

## General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (<http://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program>) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

## Foundations (grade of C or better is required.)

- **Quantification (GQ):** 6 credits
- **Writing and Speaking (GWS):** 9 credits

## Knowledge Domains

- **Arts (GA):** 6 credits
- **Health and Wellness (GHW):** 3 credits
- **Humanities (GH):** 6 credits
- **Social and Behavioral Sciences (GS):** 6 credits
- **Natural Sciences (GN):** 9 credits

**Integrative Studies (may also complete a Knowledge Domain requirement)**

- **Inter-Domain or Approved Linked Courses:** 6 credits

**University Degree Requirements****First Year Engagement**

All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

**Cultures Requirement**

6 credits are required and may satisfy other requirements

- United States Cultures: 3 credits
- International Cultures: 3 credits

**Writing Across the Curriculum**

3 credits required from the college of graduation and likely prescribed as part of major requirements.

**Total Minimum Credits**

A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

**Quality of Work**

Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

**Limitations on Source and Time for Credit Acquisition**

The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80>)). For more information, check the Suggested Academic Plan for your intended program.

**Requirements for the Major**

To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44>).

Code	Title	Credits
<b>Prescribed Courses</b>		
CMPET 211	Embedded Processors and DSP	3
EDSGN 100	Introduction to Engineering Design	3
EET 105	Electrical Systems	3
EET 275	Introduction to Programmable Logic Controls	3
EGT 114	Spatial Analysis and Computer-Aided Drafting	2

EMET 100	Computation Tools for Engineering Synthesis	1
EMET 215	Manufacturing Engineering	3
EMET 225	Applied Dynamics	2
EMET 325	Electric Drives	3
EMET 326	Mechanical Drives	3
EMET 350	Quality Control, Inspection, and Design	3
EMET 403	Electromechanical Design Project Preparation	1
EMET 405	Fluid Mechanics and Heat Transfer	3
EMET 410	Automated Control Systems	4
EMET 440	Electro-Mechanical Project Design	3
ENGL 202C	Effective Writing: Technical Writing	3
IET 101	Manufacturing Materials, Processes, and Laboratory	3
IET 333	Engineering Economics for Technologists	2
<i>Prescribed Courses: Require a grade of C or better</i>		
CMPET 117	Digital Electronics	3
CMPET 120	Digital Electronics Laboratory	1
EET 114	Electrical Circuits II	4
EET 118	Electrical Circuits Laboratory	1
EET 212	Op Amp and Integrated Circuit Electronics	4
EMET 222	Applied Mechanics	3
EMET 230	Computerized I/O Systems	3
EMET 330	Measurement Theory and Instrumentation	3
MCHT 111	Mechanics for Technology: Statics	3
<b>Additional Courses</b>		
Select 3 credits of GH or GS of the following:		3
ENGR 320Y	Design for Global Society	
STS 200	Critical Issues in Science, Technology, and Society	
STS 233	Ethics and the Design of Technology	
STS 245	Globalization, Technology, and Ethics	
Select 10-11 credits from:		10-11
CAS 100A	Effective Speech	
or CAS 100B Effective Speech		
MATH 83	Technical Calculus <sup>2,3</sup>	
or MATH 14I Calculus With Analytic Geometry I		
MATH 210	Calculus with Engineering Technology Applications	
or MATH 14I Calculus with Analytic Geometry II		
Select 6-8 credits of GN courses from two of the following groups:		6-8
<i>Group 1</i>		
PHYS 150	Technical Physics I	
PHYS 211	General Physics: Mechanics	
PHYS 250	Introductory Physics I	
<i>Group 2</i>		
PHYS 151	Technical Physics II	
PHYS 212	General Physics: Electricity and Magnetism	
PHYS 251	Introductory Physics II	
<i>Group 3</i>		
CHEM 110	Chemical Principles I	
& CHEM 111	and Experimental Chemistry I	
<i>Additional Courses: Require a grade of C or better</i>		
MATH 250	Ordinary Differential Equations <sup>4</sup>	3

or MATH 211	Intermediate Calculus and Differential Equations with Applications	
Select 5-6 credits of the following:		5-6
MATH 22 & MATH 26	College Algebra II and Analytic Geometry and Plane Trigonometry	
MATH 40	Algebra, Trigonometry, and Analytic Geometry	
MATH 81 & MATH 82	Technical Mathematics I and Technical Mathematics II <sup>1</sup>	

#### Supporting Courses and Related Areas

Select 3-4 credits of science courses, in consultation with an adviser, from the approved department list 3-4

Select 6 credits of General Technical Elective courses, in consultation with an adviser, from the approved department list 6

- <sup>1</sup> Students taking MATH 81 and MATH 82 must take MATH 83.
- <sup>2</sup> Students taking MATH 83 must take MATH 210 and MATH 211.
- <sup>3</sup> Both MATH 83 and MATH 140 require a grade of C or better.
- <sup>4</sup> Note that MATH 250 does not carry a C-requirement.

## Program Educational Objectives

The Electro-Mechanical Engineering Technology program is designed to provide a curriculum that prepares students to pursue a career in the industry and to develop in their profession. Due to their experience in the Electro-Mechanical Engineering Technology program, within few years of graduation, we expect our graduates to have the ability to:

1. Continue to develop and synthesize analytical skills in the specification, procurement, or integration of electromechanical systems.
2. Apply empirical skills in the operation, testing, or maintenance of electromechanical systems.
3. Collaborate effectively in project team activities through recognizing the global, societal, economical, and ethical contexts of their work.
4. Communicate persuasively through the preparation and delivery of technical and non-technical documentation and communications.

## Student Outcomes

Graduates of the Electro-Mechanical Engineering Technology program should demonstrate:

1. An ability to apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline.
2. An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
3. An ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature.
4. An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
5. An ability to function effectively as a member or leader on a technical team.

## Academic Advising

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of

both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information needed to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy>)

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## Suggested Academic Plan

The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2019-20 academic year. To access previous years' suggested academic plans, please visit the archive (<http://bulletins.psu.edu/undergraduate/archive>) to view the appropriate

Undergraduate Bulletin edition (Note: the archive only contain suggested academic plans beginning with the 2018-19 edition of the Undergraduate Bulletin).

## Fayette Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

### First Year

Fall	Credits	Spring	Credits
EET 105	3	CMPET 117*	3
IET 101	3	CMPET 120*	1
EDSGN 100	3	MCHT 111*	3
EMET 100	1	MATH 22**†	3
MATH 26**†	3	CAS 100**†	3
ENGL 15*†	3	EET 114*	4
PSU 8	1	EET 118*	1
	17		18

### Second Year

Fall	Credits	Spring	Credits
EMET 222*	3	EET 275	3
EGT 114	2	EET 212*	4
CMPET 211	3	EMET 225	2
MATH 140*	4	EMET 215	3
CHEM 110 & CHEM 111†	4	MATH 141*	4
	General Education (GHW)		1.5
	16		17.5

### Third Year

Fall	Credits	Spring	Credits
EMET 230*	3	EMET 330*	3
EMET 326	3	EMET 350	3
EMET 325	3	IET 333	2
PHYS 250 <sup>1</sup>	4	MATH 250	3
		PHYS 251 <sup>1</sup>	4
		STS 200, 233, or 245†	3
	13		18

### Fourth Year

Fall	Credits	Spring	Credits
EMET 410	4	EMET 405	3
EMET 403	1	EMET 440	3
EMET Technical Elective	3	EMET Technical Elective	3
General Education Course	3	General Education Course	3
General Education Course	3	ENGL 202C†	3
General Education Course	3		
	17		15

Total Credits 131.5

\* Course requires a grade of C or better for the major

† Course requires a grade of C or better for General Education

# Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

<sup>1</sup> Students who have completed PHYS 211 & PHYS 212 may substitute these courses for PHYS 250 & PHYS 251.

### University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

## New Kensington Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

### First Year

Fall	Credits	Spring	Credits
EDSGN 100	3	CMPET 117*	3
IET 101	3	CMPET 120*	1
EET 105	3	MCHT 111*	3
MATH 26*	3	MATH 22**†	3
EMET 100	1	CAS 100 (GWS)**†	3
ENGL 15 (GWS)**†	3	General Education Course	3
		General Health and Wellness (GHW)	1.5
	16		17.5

### Second Year

Fall	Credits	Spring	Credits
EMET 222*	3	EET 275	3
EET 114*	4	EMET 215	3
EGT 114	2	EMET 225	2
MATH 140*	4	MATH 141*	4
EET 118*	1	ENGL 202C (GWS)**†	3
General Education Course (GN)	3	General Health and Wellness (GHW)	1.5
	17		16.5

### Third Year

Fall	Credits	Spring	Credits
EET 212*	4	EMET 325	3

EMET 230*	3 EMET 330*	3
EMET 326	3 EMET 350	3
CMPET 211	3 General Education Course (GN)	3
MATH 250	3 IET 333	2
	STS 200, 233, or 245	3
		16
		17

**Fourth Year**

Fall	Credits Spring	Credits
EMET 410	4 EMET 405	3
EMET 403	1 EMET 440	3
General Education Course	3 EMET Technical Elective	3
General Education Course	3 General Education Course	3
EMET Technical Elective	3 General Education Course	3
General Education Course (GN)	3	
		17
		15

Total Credits 132

- \* Course requires a grade of C or better for the major
- ‡ Course requires a grade of C or better for General Education
- # Course is an Entrance to Major requirement
- † Course satisfies General Education and degree requirement

**University Requirements and General Education Notes:**

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

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Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

**York Campus**

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

**First Year**

Fall	Credits Spring	Credits
EDSGN 100	3 CMPET 117*	3
IET 101	3 CMPET 120*	1
EET 105	3 MCHT 111*	3
MATH 26*	3 MATH 22	3

ENGL 15 or 30	3 General Education course	6
EMET 100	1	
		16
		16

**Second Year**

Fall	Credits Spring	Credits
EMET 222*	3 CMPET 211	3
EMET 225*	2 EMET 215*	3
EET 114*	4 MATH 141*	4
EET 118*	1 ENGL 202C	3
MATH 140*	4 CAS 100, 100A, or 100B	3
General Education course	3	
		17
		16

**Third Year**

Fall	Credits Spring	Credits
EET 212*	4 EMET 325	3
EMET 230*	3 EMET 326	3
STS 233	3 EMET 330*	3
EET 275	3 EMET 350	3
EGT 114	2 MATH 250	3
General Education course	3 General Education course	1.5
		18
		16.5

**Fourth Year**

Fall	Credits Spring	Credits
EMET 410	4 EMET 405	3
IET 333	2 EMET 440	3
EMET 403	1 Technical Elective	3
Technical Elective	3 General Education course	6
General Education course	6 General Education course (GHW)	1.5
		16
		16.5

Total Credits 132

- \* Course requires a grade of C or better for the major
- ‡ Course requires a grade of C or better for General Education
- # Course is an Entrance to Major requirement
- † Course satisfies General Education and degree requirement

**University Requirements and General Education Notes:**

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

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GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

## Career Paths

The inclusion of both electrical and mechanical coursework in the EMET program makes our students highly marketable to employers.

EMET graduates may pursue engineering work that entails design, prototyping, testing, operation, or maintenance of equipment. Others may work in the areas of research and development, quality control, inspection of procedures and processes, manufacturing, or sales and service. These careers could be in a variety of industries including aerospace, agriculture, automotive, communications, computers, construction, energy, pharmaceuticals, plastics, or robotics to name a few.

MORE INFORMATION ABOUT POTENTIAL CAREER OPTIONS FOR GRADUATES OF THE ELECTRO-MECHANICAL ENGINEERING PROGRAM (<http://career.engr.psu.edu>)

## Opportunities for Graduate Studies

Students may choose to further their engineering education through graduate school. EMET graduates are prepared to continue their education into technical or professional Master's Degree programs. Graduate program admissions requirements vary by program and institution. Students intending to pursue this academic path are encouraged to investigate intended programs of interest early in their studies to tailor their course choices during their undergraduate studies.

Since the EMET program is ABET ETAC-accredited, EMET graduates are candidates to sit for the Fundamental of Engineering (FE) Exam, the first step in the engineering licensure process. Acceptable accreditation standards vary from state to state for professional licensure, so students must verify their state's requirements.

MORE INFORMATION ABOUT OPPORTUNITIES FOR GRADUATE STUDIES (<http://www.engr.psu.edu/students/grad-prospective/default.aspx>)

## Accreditation

### Penn State Fayette

The Electro-Mechanical Engineering Technology program at Penn State Fayette currently is not accredited.

### Penn State New Kensington

The Electro-Mechanical Engineering Technology program at Penn State New Kensington is accredited by the Engineering Technology Accreditation Commission of ABET, [www.abet.org](http://www.abet.org) (<https://www.abet.org>).

### Penn State York

The Electro-Mechanical Engineering Technology program at Penn State York is accredited by the Engineering Technology Accreditation Commission of ABET, [www.abet.org](http://www.abet.org) (<https://www.abet.org>).

## Contact

### University Park

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