

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

**Begin Campus:** Any Penn State Campus

**End Campus:** Berks

## 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 TAC 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 | 110-116 |

**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.**

## 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 (<https://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                 | Cornerstone 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                  | Introduction to Thermal Science Systems            | 3       |
| EMET 410                  | Automated Control Systems                          | 4       |
| EMET 440                  | Electro-Mechanical Project Design                  | 3       |
| IET 101                   | Manufacturing Materials, Processes, and Laboratory | 3       |
| IET 333                   | Engineering Economics for Technologists            | 2       |

*Prescribed Courses: Require a grade of C or better*

|           |   |   |
|-----------|---|---|
| CMPET 117 | Digital Electronics                       | 3 |
| CMPET 120 | Digital Electronics Laboratory            | 1 |
| EET 114   | Electrical Circuits II                    | 4 |
| EET 118   | Electrical Circuits Laboratory            | 1 |
| EET 212W  | 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 |
| ENGL 202C | Effective Writing: Technical Writing      | 3 |
| MET 111   | Mechanics for Technology: Statics         | 3 |

**Additional Courses**

|          |   |     |
|----------|---|-----|
| MATH 210 | Calculus with Engineering Technology Applications | 3-4 |
|----------|---|-----|

or MATH 141 Calculus with Analytic Geometry II

Select 3 credits of GH or GS from the following: 3

|               |   |
|---------------|---|
| ENGR 320Y     | Design for Global Society                           |
| STS 200       | Critical Issues in Science, Technology, and Society |
| STS/PHIL 233Z | Ethics and the Design of Technology                 |
| STS 245Z      | Globalization, Technology, and Ethics               |

Select 6-8 credits of GN courses from two of the following groups: 6-8

*Group 1*

|            |                              |
|------------|------------------------------|
| CHEM 110   | Chemical Principles I        |
| & CHEM 111 | and Experimental Chemistry I |

*Group 2*

|          |                            |
|----------|----------------------------|
| PHYS 150 | Technical Physics I        |
| PHYS 211 | General Physics: Mechanics |
| PHYS 250 | Introductory Physics I     |

*Group 3*

|          |  |
|----------|--|
| PHYS 151 | Technical Physics II                       |
| PHYS 212 | General Physics: Electricity and Magnetism |
| PHYS 251 | Introductory Physics II                    |

Select 3 credits from the following: 3

|           |   |
|-----------|---|
| CMPSC 121 | Introduction to Programming Techniques      |
| CMPSC 131 | Programming and Computation I: Fundamentals |
| CMPSC 200 | Programming for Engineers with MATLAB       |
| CMPSC 201 | Programming for Engineers with C++          |

*Additional Courses: Require a grade of C or better*

|         |                                 |   |
|---------|---------------------------------|---|
| MATH 83 | Technical Calculus <sup>1</sup> | 4 |
|---------|---------------------------------|---|

or MATH 140 Calculus With Analytic Geometry I

|          |  |   |
|----------|--|---|
| MATH 250 | Ordinary Differential Equations <sup>2</sup> | 3 |
|----------|--|---|

or MATH 211 Intermediate Calculus and Differential Equations with Applications

Select 3 credits from the following: 3

|          |                  |
|----------|------------------|
| CAS 100  | Effective Speech |
| CAS 100A | Effective Speech |
| CAS 100B | Effective Speech |

Select 3-5 credits from the following: 3-5

|         |   |
|---------|---|
| MATH 26 | Plane Trigonometry and Applications of Trigonometry |
| MATH 40 | Algebra, Trigonometry, and Analytic Geometry        |
| MATH 82 | Technical Mathematics II <sup>3</sup>               |

**Supporting Courses and Related Areas**

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

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

<sup>1</sup> Students taking MATH 83 must take MATH 210 and MATH 211.

<sup>2</sup> Note that MATH 250 does not carry a C-requirement.

<sup>3</sup> Students taking MATH 81 and MATH 82 must take MATH 83.

**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 (<https://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 and Inter-Domain courses do not meet this requirement.)**

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

**Breadth in the Knowledge Domains (Inter-Domain courses do not meet this requirement.)**

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

**Integrative Studies**

- **Inter-Domain Courses (Inter-Domain):** 6 credits

**Exploration**

- **GN**, may be completed with Inter-Domain courses: 3 credits
- **GA, GH, GN, GS, Inter-Domain courses.** This may include 3 credits of World Language course work beyond the 12th credit level or the requirements for the student's degree program, whichever is higher: 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 (<https://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.

## Program Educational Objectives

The educational objectives of the Electro-Mechanical Engineering Technology program are designed to prepare graduates who, within a few years after graduation, will:

1. Continue to develop and synthesize analytical skills in the specification, procurement, or integration of electromechanical systems.
2. Apply empirical skills in the safe operation, testing, or maintenance of electromechanical systems.
3. Collaborate effectively acting with the highest standards of professional integrity in project team activities through recognizing the global, societal, economical, and ethical contexts of their work.
4. Communicate persuasively ensuring a focus on technical excellence 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 as well as a leader on technical teams.

## 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 (<https://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 2023-24 academic year. To access previous years' suggested academic plans, please visit the archive (<https://bulletins.psu.edu/undergraduate/archive/>) to view the appropriate Undergraduate Bulletin edition (*Note: the archive only contains suggested academic plans beginning with the 2018-19 edition of the Undergraduate Bulletin*).

## Electro-Mechanical Engineering Technology, B.S. at Berks 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   |
|-----------------------------------|-----------|-------------------------------------|-----------|
| ENGL 15 or 30H (GWS) <sup>†</sup> | 3         | CAS 100A or 100B (GWS) <sup>†</sup> | 3         |
| MATH 26 (GQ) <sup>‡</sup>         | 3         | MATH 83 (GQ) <sup>*‡</sup>          | 4         |
| EDSGN 100                         | 3         | EET 114 <sup>*</sup>                | 4         |
| EET 105                           | 3         | EET 118 <sup>*</sup>                | 1         |
| IET 101                           | 3         | MET 111 <sup>*</sup>                | 3         |
| First Year Seminar                | 1         | EMET 100                            | 1         |
|                                   | <b>16</b> |                                     | <b>16</b> |

### Second Year

| Fall                   | Credits   | Spring                              | Credits   |
|------------------------|-----------|-------------------------------------|-----------|
| MATH 210 <sup>*</sup>  | 3         | ENGL 202C (GWS) <sup>‡</sup>        | 3         |
| CMPET 117 <sup>*</sup> | 3         | MATH 211 <sup>*</sup>               | 3         |
| CMPET 120 <sup>*</sup> | 1         | EET 275                             | 3         |
| CMPSG 131              | 3         | IET 333                             | 2         |
| EGT 114                | 2         | General Education Course (GA or GS) | 3         |
| EMET 222 <sup>*</sup>  | 3         | General Education Course (GA or GS) | 3         |
|                        | <b>15</b> |                                     | <b>17</b> |

### Third Year

| Fall                       | Credits   | Spring                     | Credits   |
|----------------------------|-----------|----------------------------|-----------|
| EET 212W <sup>*</sup>      | 4         | CMPET 211                  | 3         |
| EMET 225                   | 2         | EMET 325                   | 3         |
| EMET 230 <sup>*</sup>      | 3         | EMET 326                   | 3         |
| EMET 215                   | 3         | EMET 330 <sup>*</sup>      | 3         |
| PHYS 150 (GN) <sup>†</sup> | 3         | PHYS 151 (GN) <sup>†</sup> | 3         |
| STS 233 (GH) <sup>†</sup>  | 3         | EMET 350                   | 3         |
|                            | <b>18</b> |                            | <b>18</b> |

### Fourth Year

| Fall   | Credits      | Spring   | Credits   |
|--|--------------|--|-----------|
| EMET 403                                       | 1            | EMET 405                                       | 3         |
| EMET 410                                       | 4            | EMET 440                                       | 3         |
| Supporting Science Course <sup>†</sup>         | 3-4          | Technical Elective                             | 3         |
| Technical Elective                             | 3            | General Education Course (Integrative Studies) | 3         |
| General Education Course (Integrative Studies) | 3            | General Education Course (GHW)                 | 3         |
| General Education Course (Exploration)         | 3            |  |           |
|  | <b>17-18</b> |  | <b>15</b> |

**Total Credits 132-133**

\* 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> For General Education Course notations, please be sure to include three (3) credits of United States (US) Cultures and three (3) credits of International (IL) Cultures. Consult adviser for details.

### University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity 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.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

### College Notes:

Supporting Science Course: Choose three to four (3-4) credits from the following: BIOL 11 & 12, 110, 141, CHEM 110 & 111, 112 & 113, EGEE 101, 102, GEOG 30N, PHYS 150, 151, 211, 212, 250, or 251.

Technical Elective: Choose six (6) credits from the following: EDSGN 468, EMET 394, 402, 420, 432, 495, 496, 497, ENGR 310, 405, 408, 425, MATH 220, 230, 231, ME 300, MGMT 301, MKTG 301, or STAT 200. Additional courses may be petitioned in consultation with adviser.

### Course Offerings:

Fall Only: CMPET 117, CMPET 120, EET 212W, EGT 114, EMET 215, EMET 222, EMET 225, EMET 230, EMET 403 (and Summers), EMET 410 (and Summers), IET 101, MATH 210, PHYS 150, STS 233.

Spring Only: CMPET 211, EET 114 (and Summers), EET 118 (and Summers), EET 275, EMET 100, EMET 325, EMET 326, EMET 330, EMET 350, IET 333, MATH 83, MATH 211, MET 111, PHYS 151.

## 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 (<https://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 (<https://www.engr.psu.edu/graduate-programs/>)

## Accreditation

The Bachelor of Science in Electro-Mechanical Engineering Technology at Penn State Berks is accredited by the Engineering Technology Accreditation Commission of ABET, <https://www.abet.org>, under the General Criteria and the Electromechanical Engineering Technology Program Criteria.

## Professional Licensure/Certification

Many U.S. states and territories require professional licensure/certification to be employed. If you plan to pursue employment in a licensed profession after completing this program, please visit the Professional Licensure/Certification Disclosures by State (<https://www.psu.edu/state-licensure-disclosures/>) interactive map.

## Contact

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