

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

Begin Campus: Any Penn State Campus

End Campus: Altoona

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 (<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.)

- **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 |
|---------------------------|--|---------|
| Prescribed Courses | | |
| 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 | 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 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 |
| MET 111 | Mechanics for Technology: Statics | 3 |
| Additional Courses | | |
| 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 233Z | Ethics and the Design of Technology | |
| STS 245Z | Globalization, Technology, and Ethics | |
| Select 10-11 credits from: | | 10-11 |
| CAS 100A | Effective Speech | |
| or CAS 100B Effective Speech | | |
| MATH 83 | Technical Calculus ^{2,3} | |
| 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 ⁴ | 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 ¹ | |

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

- ¹ Students taking MATH 81 and MATH 82 must take MATH 83.
² Students taking MATH 83 must take MATH 210 and MATH 211.
³ Both MATH 83 and MATH 140 require a grade of C or better.
⁴ 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 (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy/>)

Altoona

Jordan Bittner

Program Coordinator, Instructor of Engineering
 Learning Resources Center 145
 3000 Ivyside Park
 Altoona, PA 16601
 814-949-5304
 jls5991@psu.edu

Berks

Marietta Scanlon

Program Coordinator, Assistant Teaching Professor
 Gaige 219
 Reading, PA 19610
 610-396-6126
 mrs35@psu.edu

Fayette

Nathaniel Bohna, Ph.D.

Program Coordinator, Associate Teaching Professor in Engineering
 2201 University Drive
 301A Eberly Building
 Lemont Furnace, PA 15456
 724-430-4109
 nab141@psu.edu

New Kensington

Joseph Cuiffi, Ph.D.

Program Coordinator, Assistant Teaching Professor in Engineering
 3550 Seventh Street Rd.
 13 Tech. Bldg.
 New Kensington, PA 15068
 724-334-6730
 jdc167@psu.edu

York

Harley H. Hartman, P.E.

Program Coordinator, Assistant Teaching Professor in Engineering
 Main Classroom Building, Room 35
 York, PA 17403
 717-771-4097
 hhh2@psu.edu

Suggested Academic Plan

The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2021-22 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 contain suggested academic plans beginning with the 2018-19 edition of the Undergraduate Bulletin*).

Electro-Mechanical Engineering Technology, B.S. at Altoona 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 MATH 82 (GQ) [‡] | 3 |
| MATH 81 (GQ) [‡] | 3 MET 111 [*] | 3 |
| General Education Course | 3 CMPET 117 [*] | 3 |
| EET 105 | 3 CMPET 120 [*] | 1 |
| IET 101 | 3 ENGL 15, 30H, or ESL 15 (GWS) ^{††} | 3 |
| EMET 100 | 1 General Education Course | 3 |
| PSU 3 | 1 | |
| | 17 | 16 |

Second Year

| Fall | Credits Spring | Credits |
|---------------------------|---------------------------------|--------------|
| MATH 83 (GQ) [*] | 4 MATH 210 [*] | 3 |
| EGT 114 | 2 General Education Course (GN) | 3-4 |
| EET 114 [*] | 4 EET 212W [*] | 4 |
| EET 118 [*] | 1 EMET 215 | 3 |
| EMET 222 [*] | 3 EET 275 | 3 |
| General Education Course | 3 EMET 225 | 2 |
| | 17 | 18-19 |

Third Year

| Fall | Credits Spring | Credits |
|-------------------------------|------------------------------------|--------------|
| EMET 230 [*] | 3 EMET 330 [*] | 3 |
| CMPET 211 | 3 EMET 325 | 3 |
| MATH 211 [*] | 3 EMET 326 | 3 |
| ENGL 202C (GWS) ^{††} | 3 CAS 100A (GWS) ^{††} | 3 |
| General Education Course | 3 General Education Course (GN) | 3-4 |
| General Education Course (GN) | 3-4 General Education Course (GHW) | 3 |
| | 18-19 | 18-19 |

Fourth Year

| Fall | Credits Spring | Credits |
|--------------------------|----------------------------|---------|
| EMET 405 | 3 EMET 350 | 3 |
| EMET 410 | 4 EMET 440 | 3 |
| Technical Elective | 3 General Education Course | 3 |
| IET 333 | 2 General Education Course | 3 |
| General Education Course | 3 Technical Elective | 3 |

| | | |
|----------|-----------|-----------|
| EMET 403 | 1 | |
| | 16 | 15 |

Total Credits 135-138

- * 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.

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.

College Notes:

Sequential Nature of the Program:

Courses offered during each semester of the EMET program generally build upon material taught in previous semesters. Many courses have prerequisites listed in the Undergraduate Degree Programs Bulletin. Therefore, if a student fails to take a course during the targeted semester, he/she may be unable to schedule courses in subsequent semesters as well. The end result may be a degree program that extends beyond the traditional four years.

Note 1: Math Sequence

High school graduates who test into technical mathematics: Math 81, 82, 83, 210 and 211. Additionally, Math 40 or Math 22 and Math 26 may be used to substitute for Math 81 and 82.

High school graduates who test into calculus: Math 83, 210 and 211 or Math 140, 141, and 250. Students who complete either of these sequences to fulfill the math requirements will need to complete additional technical elective credits. Please see an adviser for more information.

Note 2: Science Courses

Students are required to complete nine credits of science. **At least two** courses from the following list must be completed:

- PHYS 150 GN(3) or PHYS 211 GN(4) or PHYS 250 GN(4);
- PHYS 151 GN(3) or PHYS 212 GN(4) or PHYS 251 GN(4);
- CHEM 110 GN(3) and CHEM 111 GN(1);

Students may complete **no more than one selection** from the following. (If the student completes three selections from the first list, no additional courses are required):

- BIOL 011 GN(3) and BIOL 012 GN(1);
- BIOL 110 GN(4);
- BIOL 141 GN(3);
- CHEM 112 GN(3) and CHEM 113 GN(1);
- EGEE 101 GN(3);
- EGEE 102 GN(3);

Due to limited faculty resources, several program courses are only offered during one semester of the year. In addition, EMET courses are not traditionally offered during the summer months.

Approved technical elective courses are:

- CMPSC 201C (3) or CMPSC 121 (3);
- EMET 401 (1), EMET 402 (2), EMET 403 (1), EMET 394 (1-3), EMET 430 (3),
- ENTR 300 (3), ENTR 320 (3),
- MATH 220 (2), MATH 231 (2), STAT 200 (4)
- MGMT 301 (3), MKTG 301 (3)

Other courses may be accepted toward technical elective credits. Please check with your adviser for more information.

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

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

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://psu.edu/state-licensure-disclosures/>) interactive map.

Contact

Altoona

DIVISION OF BUSINESS, ENGINEERING, AND INFORMATION SCIENCES
AND TECHNOLOGY
Learning Resources Center 145
3000 Ivyside Park
Altoona, PA 16601
814-949-5304
jls5991@psu.edu

<http://altoona.psu.edu/academics/bachelors-degrees/electro-mechanical-engineering-technology/request-information> (<http://altoona.psu.edu/academics/bachelors-degrees/electro-mechanical-engineering-technology/request-information/>)

Berks

EBC DIVISION
Gaige Building
Reading, PA 19610
610-396-6126
mrs35@psu.edu

<http://berks.psu.edu/bs-electro-mechanical-engineering-technology> (<http://berks.psu.edu/bs-electro-mechanical-engineering-technology/>)

Fayette

ELECTRO-MECHANICAL ENGINEERING TECHNOLOGY
2201 University Drive
Lemont Furnace, PA 15456
724-430-4109
nab141@psu.edu

<https://fayette.psu.edu/academics/baccalaureate/electro-mechanical-engineering-technology> (<https://fayette.psu.edu/academics/baccalaureate/electro-mechanical-engineering-technology/>)

New Kensington

ELECTRO-MECHANICAL ENGINEERING TECHNOLOGY
3550 Seventh Street Rd.
New Kensington, PA 15068
724-334-6730
jdc167@psu.edu

<https://newkensington.psu.edu/4-year-electro-mechanical-engineering-technology> (<https://newkensington.psu.edu/4-year-electro-mechanical-engineering-technology/>)

University Park

SCHOOL OF ENGINEERING DESIGN, TECHNOLOGY, AND PROFESSIONAL PROGRAMS

213 Hammond Building
University Park, PA 16802
814-865-2952

<http://www.sedtapp.psu.edu>

York

ELECTRO-MECHANICAL ENGINEERING TECHNOLOGY

1031 Edgecomb Avenue
York, PA 17403
717-771-4097
hhh2@psu.edu

<https://york.psu.edu/academics/baccalaureate/electro-mechanical-engineering-technology> (<https://york.psu.edu/academics/baccalaureate/electro-mechanical-engineering-technology/>)