

BIOMEDICAL ENGINEERING TECHNOLOGY, A.ENG.T.

Begin Campus: Wilkes-Barre, Altoona, Berks, DuBois, Erie, Fayette, New Kensington, York

End Campus: New Kensington

Program Description

The medical community has grown to depend on medical devices and systems to diagnose, treat and monitor patients in health care. These medical devices have become very complex systems, as they are becoming microprocessor controlled, PC based, and networked to share information. Biomedical Equipment Technicians (BETs) are specialized individuals who are educated and trained on the methods of: physiological measurement; equipment application and operation; safety, performance and preventive maintenance testing; calibration; problem solving; and troubleshooting. In addition, BETs may be involved in equipment and technology management programs, selection and installation of medical equipment, manufacturer and FDA recalls of medical devices, quality improvement programs, and training programs for hospital personnel in the safe and proper use of medical equipment. The classroom and laboratory portions of this major focus on electronically and PC based medical devices for patient monitoring and life-support equipment. The student is exposed to a much broader spectrum of medical equipment through a 400-hour (ten-week) practical internship in an approved health care facility.

Students completing the 2BET degree need only complete several additional courses to obtain the Associate in Engineering Technology degree in Electrical Engineering Technology. Graduates of the program may qualify for admission to the baccalaureate degree major in Electrical Engineering Technology offered at Penn State Harrisburg, Electrical and Computer Engineering Technology offered at Penn State Erie, and Electro-Mechanical Engineering Technology offered at Penn State Altoona, Berks, New Kensington and York.

What is Biomedical Engineering Technology?

Technicians in the biomedical engineering technology field are highly skilled, trained professionals who are responsible for functional and safety inspections, preventive maintenance, calibration, troubleshooting, equipment repair, and the training of hospital personnel in the safe and proper use of medical equipment.

You Might Like This Program If...

- You are interested in the healthcare industry.
- You are passionate about technology and electronics.
- You enjoy working both in a team and individually.
- You know you want to work in a setting in which you operate, install, test, maintain and inspect mechanical and electronic equipment.

Entrance to Major

Students must have a minimum 2.0 GPA to change to this Associate degree after admission to the University.

Degree Requirements

For the Associate in Engineering Technology degree in Biomedical Engineering Technology, a minimum of 71 credits is required:

Requirement	Credits
General Education	21
Requirements for the Major	62-63

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/associate-degree-general-education-program>) section of the Bulletin and consult your academic adviser.

Foundations (grade of C or better is required.)

- **Quantification (GQ):** 3 credits
- **Writing and Speaking (GWS):** 3 credits

Knowledge Domains

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

Foundations or Knowledge Domains

- **A General Education course selected from GWS, GQ, GN, GA, GH, or GS, and may include Integrative Studies (Inter-domain or Linked) courses:** 3 credits

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.

12 of these 21 credits are included in the Requirements for the Major.

University Degree Requirements

Cultures Requirement

3 credits of United States (US) or International (IL) cultures coursework are required and may satisfy other requirements

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 60 degree credits must be earned for an associate's degree. The requirements for some programs may exceed 60 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

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

This includes 12 credits of General Education courses: 3 credits of GN courses; 3 credits of GQ courses; 6 credits of GWS courses.

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		
BE_T 101	Introduction to Medical Equipment Maintenance	1
CHEM 101	Introductory Chemistry	3
EET 105	Electrical Systems	3
CMPET 117	Digital Electronics	3
CMPET 120	Digital Electronics Laboratory	1
ENGL 15	Rhetoric and Composition	3
IST 220	Networking and Telecommunications	3
CAS 100	Effective Speech	3
PHYS 150	Technical Physics I	3
RADSC 230	Radiographic Physics	3
<i>Prescribed Courses: Require a grade of C or better</i>		
IST 110	Information, People and Technology	3
BE_T 201	Medical Equipment & Systems I	5
BE_T 204	Medical Equipment and Systems II	5
BE_T 205	Medical Electronics	4
BE_T 203	Biomedical Equipment Laboratory (Internship) (must be the last course taken for the degree)	4
Additional Courses		
MATH 22 & MATH 26 or MATH 40	College Algebra II and Analytic Geometry and Plane Trigonometry Algebra, Trigonometry, and Analytic Geometry	5-6
BISC 4 or BIOL 141	Human Body: Form and Function Introductory Physiology	3
Select 3 credits from the following technical courses:		3
BE_T 210	Troubleshooting Medical Equipment	
BE_T 296	Independent Studies	
BE_T 297	Special Topics	
BIOL 129	Mammalian Anatomy	
CMPET 211	Embedded Processors and DSP	
CMPSC 101	Introduction to C++ Programming	
EDSGN 100	Introduction to Engineering Design	
EET 213W	Fundamentals of Electrical Machines Using Writing Skills	
EET 297	Special Topics	
EGT 201	Advanced Computer Aided Drafting	
MCHT 111	Mechanics for Technology: Statics	

Additional Courses: Require a grade of C or better

BE_T 202	4
or BE_T 206	Medical Computers and Networks

Program Educational Objectives

The BET major prepares graduates who, during the first few years of professional practice, will be able to:

- Apply knowledge of medical devices to install, perform acceptance testing and preventive maintenance (PMs) inspections, troubleshoot, and repair a wide variety of medical devices.
- Be employed in the healthcare technology management (HTM) profession, and advance their careers by engaging in continuous learning through CBET certification and/or other professional training programs and independent study.
- Identify and apply standards, regulations, and quality improvement plans regarding medical equipment.
- Work both independently and collaboratively in multi-disciplinary teams, communicating effectively with relevant healthcare related professionals.

Student Outcomes

The BET program outcomes are as follows:

1. Understand use, application, operation, installation, acceptance testing, preventive maintenance, performance assurance and safety inspections (PMs) on select medical devices.
2. Understand and apply a fundamental knowledge of electrical and electronic engineering technology fundamentals, components, circuits and networking fundamentals.
3. Apply basic mathematical and scientific principles to identify, analyze and solve technical problems.
4. Be aware of and understand diversity, professional and ethical responsibilities, applicable standards and regulations regarding medical equipment support.
5. Work with fellow technicians, clinical professionals and other related professionals by functioning effectively on teams and by independent work.
6. Communicate effectively with fellow technicians, clinical professionals and other related professionals.
7. Recognize and understand the need for continued professional development, including formal and informal study.
8. Recognize, observe and participate when possible in quality improvement programs, timeliness and commitment to continuous improvement that support medical equipment and systems.

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 need 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>)

New Kensington

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Suggested Academic Plan Biomedical Engineering Technology at 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
BE_T 101	1 CMPET 117	3
EET 105	3 CMPET 120	1
IST 110*	3 IST 220	3
MATH 26	3 MATH 22 (GQ)*	3
ENGL 15*	3 CHEM 101	2-3
General Education Course	3 General Education Course	3
	16	15-16

Second Year

Fall	Credits Spring	Credits Summer	Credits
BE_T 201*	5 BE_T 206*	4 BE_T 203*	4
BE_T 205*	4 BE_T 204*	5	
BIOL 141 or BISC 4 (GN)†	3 Technical Elective (See Adviser for list)	3	
PHYS 150 (GN)	3 CAS 100	3	
RADSC 230	3 General Education Course	3	
	18	18	4

Total Credits 71-72

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

Integrative Studies courses can be completed 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

Students with a degree in biomedical engineering technology are well positioned for careers at hospitals, clinics, medical practice offices, surgical centers, nursing homes, and rehabilitation centers.

Penn State students with an A.S. in Biomedical Engineering Technology have been successful in pursuing various careers within the Healthcare Technology Management field.

Careers

- Biomedical Engineering Technician/Clinical Engineer in a Hospital
- Field Service Technician
- Repair Technician for a Medical Device Company

MORE INFORMATION ABOUT CAREERS (<http://career.engr.psu.edu>)

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

Accreditation

This program is accredited by the Engineering Technology Accreditation Commission of ABET, www.abet.org (<http://www.abet.org>).

MORE INFORMATION (<http://www.abet.org>)

Contact

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