BIOMEDICAL ENGINEERING TECHNOLOGY, A.ENGT.

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:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>21</td>
</tr>
<tr>
<td>Requirements for the Major</td>
<td>62-63</td>
</tr>
</tbody>
</table>

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 a associates 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

**Prescribed Courses: Require a grade of C or better**
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) | 4

**Additional Courses**
MATH 22 | College Algebra II and Analytic Geometry | 5
MATH 26 | and Plane Trigonometry | 6
or MATH 40 | Algebra, Trigonometry, and Analytic Geometry | 3
BISC 4 | Human Body: Form and Function | 3
or BIOL 141 | Introductory Physiology | 3
Select 3 credits from the following technical courses: | 3
BE_T 210 | Troubleshooting Medical Equipment | 3
BE_T 296 | Independent Studies | 4
BE_T 297 | Special Topics | 5
BIOL 129 | Mammalian Anatomy | 6
CMPET 211 | Embedded Processors and DSP | 3
CMPSC 101 | Introduction to C++ Programming | 4
EDSNG 100 | Introduction to Engineering Design | 3
EET 213W | Fundamentals of Electrical Machines Using Writing Skills | 5
EET 297 | Special Topics | 6
EGT 201 | Advanced Computer Aided Drafting | 7
MCHT 111 | Mechanics for Technology: Statics | 8

Additional Courses: Require a grade of C or better
BE_T 202 | Medical Computers and Networks | 4

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.

<table>
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<th>First Year</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
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<tr>
<td>Fall</td>
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<td></td>
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</tr>
<tr>
<td>BE_T 101</td>
<td>1</td>
<td>CMPET 117</td>
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<tr>
<td>EET 105</td>
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<td>CMPET 120</td>
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<tr>
<td>IST 110†</td>
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<td>IST 220</td>
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<tr>
<td>MATH 26</td>
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<td>MATH 22 (GQ)*</td>
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<th>Second Year</th>
<th>Credits</th>
<th>Spring</th>
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<td>Fall</td>
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<tr>
<td>BE_T 201*</td>
<td>5</td>
<td>BE_T 206*</td>
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<tr>
<td>BE_T 205*</td>
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<td>BE_T 204*</td>
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<tr>
<td>BIOL 141 or BISC 4 (GN)†</td>
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<td>Technical Elective (See Adviser for list)</td>
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<tr>
<td>PHYS 150 (GN)</td>
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<td>CAS 100</td>
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<tr>
<td>RADSC 230</td>
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<td>General Education Course</td>
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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)

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