

# Electrical Engineering Technology - Biomedical Equipment Major (BMT)

## Electrical Engineering Technology - Biomedical Equipment Major (BMT)

Graduates of the program Electrical Engineering Technology - Biomedical Equipment Major are welcomed in hospitals and companies where medical equipment is designed, tested, installed, and operated because of their strong background in electronics and information systems along with knowledge of specialized biomedical equipment.

Graduates of the Biomedical Equipment Major earn an Associate of Applied Science degree and are prepared to take on the challenging tasks of hospital healthcare technology management and maintaining multi-million dollar equipment such as MRI, CT, sonogram, X-ray, and other medical equipment.

The curriculum also provides an effective foundation for transfer into a related bachelor's degree program.

For more information, please contact the Engineering and Information Technologies Division at (513) 569-1743.

To apply for this program at Cincinnati State, visit the Admissions (<http://www.cincinnati.edu/academics/admission/>) section of the College website.

## Electrical Engineering Technology - Biomedical Equipment Major (BMT)

Semester 1		Lec	Lab	Credits
EET 100	Introduction to Electrical Engineering Technology ( B )	1	2	2
ENG 101	English Composition 1 ( G )	3	0	3
CIT 190	Career Preparation: Engineering and Information Technologies ( B )	1	0	1
MAT XXX	Mathematics Elective 1 ( B )	3	2	4
FYE 1XX	First Year Experience Elective ( B )	1	0	1
Semester 2				
BMT 161	Biomedical Instrumentation 1 ( T )	3	3	4
EET 131	Circuit Analysis 1 ( T )	3	2	4
MAT XXX	Mathematics Elective 2 ( G )	3	2	4

Semester 3				
EET 132	Circuit Analysis 2 ( T )	3	2	4
ENG 10X	English Composition Elective ( G )	3	0	3
EET 291	Full-Time Cooperative Education 1: Electronics Engineering Technology ( B )	1	40	2
Semester 4				
ESET 251	Electronics ( T )	3	3	4
PHY XXX	Physics Elective ( G )	2	3	3
EET 121	Digital Systems 1 ( T )	2	3	3
NETC 121	Network Communications 1 ( B )	3	2	4
Semester 5				
BMT 262	Biomedical Instrumentation 2 ( T )	3	3	4
NETC 122	Network Communications 2 ( T )	2	2	3
ECO 1XX	Economics Elective ( G )	3	0	3
EMET XXX	Electro-Mechanical Engineering Technology Elective ( T )	2	3	3
Semester 6				
BIO 117	Human Body in Health and Disease ( B )	3	0	3
EET 292	Full-Time Cooperative Education 2: Electronics Engineering Technology ( T )	1	40	2

<b>Total Credits:</b>	<b>49</b>	<b>112</b>	<b>64</b>
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## Electives

### Mathematics Elective

Take one of the following series:

MAT 125 Algebra and Trigonometry & MAT 126 and Functions and Calculus

Or

MAT 251 Calculus 1 & MAT 252 and Calculus 2

### First Year Experience Elective

FYE 100	Essentials for College Success	1
FYE 105	Skills for Academic and Personal Success	2
FYE 110	Intensive College Success Strategies	3
FYE 120	College Success Strategies: Campus Integration	4

### English Composition Elective

ENG 102	English Composition 2: Contemporary Issues	3
ENG 103	English Composition 2: Writing about Literature	3

ENG 104	English Composition 2: Technical Communication	3
ENG 105	English Composition 2: Business Communication	3
<b>Physics Elective</b>		
PHY 110	Health Physics	3
PHY 151	Physics 1: Algebra and Trigonometry-Based	4
PHY 201	Physics 1: Calculus-Based	5
<b>Economics Elective</b>		
ECO 105	Principles of Microeconomics	3
ECO 110	Principles of Macroeconomics	3
<b>Electro-Mechanical Engineering Technology Elective</b>		
EMET 141	Programmable Logic Controllers	3
EMET 180	Process Instrumentation	3
EMET 245	Laser 1	3
EMET 252	Motors, Motor Controls, and Variable Drives	3
EMET 270	Robotics and Servomechanisms	3

Some courses are offered in alternative versions identified with a letter after the course number-- for example, ENG 101 and ENG 101A.

- This curriculum displays only course numbers without the added letter.
- The alternative version, when available, meets the requirements of the course version without the added letter.

The letters G, B, and T (displayed after course titles or elective descriptions) identify types of courses required by the Ohio Department of Higher Education as part of an associate's degree curriculum.

G = General Education course in this curriculum

B = Basic Skills course in this curriculum

T = Technical course in this curriculum

## Electrical Engineering Technology - Biomedical Equipment Major (BMT)

- An ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies.
- An ability to function effectively as a member or leader on a technical team.
- An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature.
- An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes.
- A commitment to quality, timeliness, and continuous improvement.
- An ability to apply project management techniques to electrical/electronic(s) systems development.
- An ability to proficiently apply circuit analysis and design, computer programming, associated software, analog and digital electronics, microcontroller technology, and engineering standards to the building, testing, operation, and maintenance of electrical/electronic(s) systems.

- An ability to integrate and synthesize technical information to resolve discrepancies requiring electrical or electronic knowledge.

## BMT Courses

### **BMT 161 Biomedical Instrumentation 1** **4 Credits. 3 Lecture Hours. 3 Lab Hours.**

A course on the role of the biomedical engineering technician, and fundamentals of systems and device maintenance. Topics include: hospital organization and regulations, professional certifications, safety, medical device maintenance, and technology management. Prerequisites: MAT 124 (minimum grade C) or appropriate Math placement

Corequisites: EET 131 : Circuit Analysis 1

### **BMT 191 Part-Time Cooperative Education 1: Biomedical Equipment and Information Systems Technology** **1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their first part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: None

### **BMT 192 Part-Time Cooperative Education 2: Biomedical Equipment and Information Systems Technology** **1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their second part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: BMT 191

### **BMT 193 Part-Time Cooperative Education 3: Biomedical Equipment and Information Systems Technology** **1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their third part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: BMT 192

### **BMT 194 Part-Time Cooperative Education 4: Biomedical Equipment and Information Systems Technology** **1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their fourth part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: BMT 193

### **BMT 195 Part-Time Cooperative Education 5: Biomedical Equipment and Information Systems Technology** **1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their fifth part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: BMT 194

**BMT 196 Part-Time Cooperative Education 6: Biomedical Equipment and Information Systems Technology****1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their sixth part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: BMT 195

**BMT 262 Biomedical Instrumentation 2****4 Credits. 3 Lecture Hours. 3 Lab Hours.**

A continuation of BMT 161. Topics include: patient and surgical monitoring, complex medical devices, imaging equipment, medical technology management, equipment malfunction, and globalization.

Prerequisites: EET 121 (minimum grade C) and BMT 161 and EET 132

Corequisites: ESET 251 : Electronics

**BMT 291 Full-Time Cooperative Education 1: Biomedical Equipment and Information Systems Technology****2 Credits. 1 Lecture Hour. 40 Lab Hours.**

Students seeking an associate's degree participate in their first full-time field learning experience related to their degree. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: None

**BMT 292 Full-Time Cooperative Education 2: Biomedical Equipment and Information Systems Technology****2 Credits. 1 Lecture Hour. 40 Lab Hours.**

Students seeking an associate's degree participate in their second full-time field learning experience related to their degree. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: BMT 291

**BMT 293 Full-Time Cooperative Education 3: Biomedical Equipment and Information Systems Technology****2 Credits. 1 Lecture Hour. 40 Lab Hours.**

Students seeking an associate's degree participate in their third full-time field learning experience related to their degree. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: BMT 292

**BMT 294 Internship 1: Biomedical Equipment and Information Systems Technology****2 Credits. 1 Lecture Hour. 40 Lab Hours.**

Students seeking an associate's degree participate in their first unpaid field learning experience related to their degree. Students must follow applicable policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: BMT 151 and CIT 190

**BMT 295 Internship 2: Biomedical Equipment and Information Systems Technology****2 Credits. 1 Lecture Hour. 40 Lab Hours.**

Students seeking an associate's degree participate in their second unpaid field learning experience related to their degree. Students must follow applicable policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: BMT 294

**EET Courses****EET 100 Introduction to Electrical Engineering Technology****2 Credits. 1 Lecture Hour. 2 Lab Hours.**

An introduction to concepts and measuring skills for the electronics field. Topics include: current, voltage, power, Ohm's law, series circuits, meter reading, software simulation use, and circuit construction.

Prerequisites: MAT 093 or appropriate placement

**EET 101 Electronic Fundamentals 1****3 Credits. 2 Lecture Hours. 3 Lab Hours.**

A course on electrical fundamentals for non-electrical majors. Topics include: DC and AC circuit theory, electrical motors and controls, electromagnetic devices, and transformers.

Prerequisites: Placement into ENG 101A MAT 096 or MAT 124 or appropriate Math placement

**EET 121 Digital Systems 1****3 Credits. 2 Lecture Hours. 3 Lab Hours.**

A course on analyzing, designing, and troubleshooting digital logic circuits. Topics include: basic gates and programmable logic devices (PLDs); number systems and codes; Boolean algebra; circuit simplification; and functions of logic circuits, latches, flip-flops, counters, timers, and memory.

Prerequisites: MAT 124 (minimum grade C) or appropriate Math placement

Corequisites: EET 131 : Circuit Analysis 1

**EET 122 Digital Systems 2****3 Credits. 2 Lecture Hours. 3 Lab Hours.**

A continuation of EET 121. Topics include: counter design and cascading, shift registers, PLD applications, microprocessor registers, input/output (I/O), busses, direct memory access (DMA), memory expansion, and assembly language programming.

Prerequisites: EET 121 (minimum grade C)

**EET 131 Circuit Analysis 1****4 Credits. 3 Lecture Hours. 2 Lab Hours.**

A course on DC electric circuits. Topics include: current, voltage, resistance, and power; laws applied to series, parallel, and series-parallel circuits; Thevenin's, Superposition, and Norton's theorems; steady state and transient behavior of capacitive and inductive devices; and magnetic properties.

Prerequisites: MAT 124 (minimum grade C) or appropriate Math placement

Corequisites: EET 100 : Introduction to Electrical Engineering Technology or EMET 150 : Introduction to Controls and Robotics  
Ohio Transfer Assurance Guide Approved**EET 132 Circuit Analysis 2****4 Credits. 3 Lecture Hours. 2 Lab Hours.**

A continuation of EET 131. Topics include: sinusoidal wave characteristics; complex numbers; phasors; transformers; RC, RL, and RLC networks; filter networks; three-phase and poly-phase systems; and power factor analysis.

Prerequisites: MAT 125 or appropriate Math placement (minimum grade C) EET 131 (minimum grade C)

Ohio Transfer Assurance Guide Approved

**EET 191 Part-Time Cooperative Education 1: Electronics Engineering Technology****1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their first part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: None

**EET 192 Part-Time Cooperative Education 2: Electronics Engineering Technology****1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their second part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EET 191

**EET 193 Part-Time Cooperative Education 3: Electronics Engineering Technology****1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their third part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EET 192

**EET 194 Part-Time Cooperative Education 4: Electronics Engineering Technology****1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their fourth part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EET 193

**EET 195 Part-Time Cooperative Education 5: Electronics Engineering Technology****1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their fifth part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EET 194

**EET 196 Part-Time Cooperative Education 6: Electronics Engineering Technology****1 Credit. 1 Lecture Hour. 20 Lab Hours.**

Students seeking an associate's degree participate in their sixth part-time field learning experience related to their degree. Students are expected to register for academic courses during the same semester. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EET 195

**EET 291 Full-Time Cooperative Education 1: Electronics Engineering Technology****2 Credits. 1 Lecture Hour. 40 Lab Hours.**

Students seeking an associate's degree participate in their first full-time field learning experience related to their degree. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: None

**EET 292 Full-Time Cooperative Education 2: Electronics Engineering Technology****2 Credits. 1 Lecture Hour. 40 Lab Hours.**

Students seeking an associate's degree participate in their second full-time field learning experience related to their degree. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EET 291

**EET 293 Full-Time Cooperative Education 3: Electronics Engineering Technology****2 Credits. 1 Lecture Hour. 40 Lab Hours.**

Students seeking an associate's degree participate in their third full-time field learning experience related to their degree. Students must follow cooperative education policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EET 292

**EET 294 Internship 1: Electronics Engineering Technology****2 Credits. 1 Lecture Hour. 40 Lab Hours.**

Students seeking an associate's degree participate in their first unpaid field learning experience related to their degree. Students must follow applicable policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EET 131 and CIT 190

**EET 295 Internship 2: Electronics Engineering Technology****2 Credits. 1 Lecture Hour. 40 Lab Hours.**

Students seeking an associate's degree participate in their second unpaid field learning experience related to their degree. Students must follow applicable policies and procedures to earn credit. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: EET 294