

# 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, 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 Center for Innovative Technologies 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 131	Circuit Analysis 1 ( B )	3	2	4
MAT XXX	Mathematics Elective 1 ( G )	3	2	4
ENG 101	English Composition 1 ( G )	3	0	3
FYE 1XX	First Year Experience Elective ( B )	1	0	1
Semester 2				
EET 132	Circuit Analysis 2 ( T )	3	2	4
CIT 190	Career Preparation: Engineering and Information Technologies ( B )	1	0	1
EET 121	Digital Systems 1 ( T )	2	3	3
BMT 161	Biomedical Instrumentation 1 ( T )	3	3	4
Semester 3				
EET 291	Full-Time Cooperative Education 1: Electronics Engineering Technology ( T )	1	40	2
NETC 121	Network Communications 1 ( B )	2	2	3

MAT XXX	Mathematics Elective 2 ( B )	3	2	4
Semester 4				
BIO 117	Human Body in Health and Disease ( B )	3	0	3
ESET 251	Electronics ( T )	3	2	4
PHY XXX	Physics Elective ( G )	3	2	4
EET 122	Digital Systems 2 ( T )	2	3	3
Semester 5				
ENG 10X	English Elective ( G )	3	0	3
BMT 262	Biomedical Instrumentation 2 ( T )	3	3	4
EMET XXX	Electro- Mechanical Engineering Technology Elective ( T )	2	3	3
EET XXX	Electrical Engineering Technology Elective 1 ( T )	2	3	3
Semester 6				
EET XXX	Electrical Engineering Technology Elective 2 ( T )	1	40	2
ECO 10X	Economics Elective ( G )	3	0	3
Total Credits:		50	112	65

## Electives

<b>Mathematics Elective</b>		8
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	
<b>First Year Experience Elective</b>		
FYE 100	College Survival Skills	1
FYE 105	College Success Strategies	2
FYE 110	Community College Experience	3
<b>Physics Elective</b>		
PHY 151	Physics 1: Algebra and Trigonometry-Based	4
PHY 201	Physics 1: Calculus-Based	5
<b>English Composition Elective</b>		
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>Electro-Mechanical Engineering Technology Elective</b>		3
EMET 240	Programmable Logic Controllers, Motors, Motor Controls, and Kinematics	3
EMET 245	Laser 1	3
EMET 270	Robotics and Servomechanisms	4
<b>Electrical Engineering Technology Electives</b>		3
Any EET (2XX level)		
or, Any ESET (2XX level)		
or, Any PSET		
or, Any EMET not used to fulfill the Electro-Mechanical Engineering Technology Elective		
<b>Economics Elective</b>		
ECO 105	Principles of Microeconomics	3
ECO 110	Principles of Macroeconomics	3

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)

- Ability to select and apply knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies.
- Ability to function effectively as a member or leader on a technical team.
- Ability to apply written, oral, and graphical communication in both technical and non-technical environments; and ability to identify and use appropriate technical literature.
- Ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes.
- Commitment to quality, timeliness, and continuous improvement.
- Ability to apply project management techniques to electrical/electronic(s)/biomedical systems development.
- Proficiency in the application of circuit analysis and design, network systems, healthcare software, analog and digital electronics, electric motor technology, and engineering standards to the building, testing, operation, and maintenance of electrical, electronic, and biomedical systems.
- Proficiency in using exceptional troubleshooting skills based on hands-on knowledge of key biomedical instrumentation.

## Faculty

### Program Chair

Dr. Ralph Whaley, Jr., PhD

ralph.whaley@cincinnatiastate.edu

## Co-op Coordinator

Professor Kimberly Richards, PhD

kimberly.richards@cincinnatiastate.edu

## 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: EET 131

### 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 198 First Year Special Topics in Biomedical Equipment and Information Systems Technology****1-9 Credits. 0 Lecture Hour. 0 Lab Hour.**

A course on selected topics related to Biomedical Equipment and Information Systems Technology, which gives students opportunities to study information not currently covered in other courses. Grades issued are A, B, C, D, or F.

Prerequisites: Instructor Approval

**BMT 199 First Year Independent Project in Biomedical Equipment and Information Systems Technology****1-9 Credits. 0 Lecture Hour. 0 Lab Hour.**

A project related to Biomedical Equipment and Information Systems Technology that is completed by one or more students to meet specific educational goals. Projects must have prior approval and supervision by Biomedical Equipment and Information Systems Technology faculty. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: Instructor Approval

**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: BMT 161 and EET 122 and EET 132 and ESET 251

**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

**BMT 298 Second Year Special Topics in Biomedical Equipment and Information Systems Technology****1-9 Credits. 0 Lecture Hour. 0 Lab Hour.**

A course on selected topics related to Biomedical Equipment and Information Systems Technology, which gives students opportunities to study information not currently covered in other courses. Grades issued are A, B, C, D, or F.

Prerequisites: Instructor Approval

**BMT 299 Second Year Independent Project in Biomedical Equipment and Information Systems Technology****1-9 Credits. 0 Lecture Hour. 0 Lab Hour.**

A project related to Biomedical Equipment and Information Systems Technology that is completed by one or more students to meet specific educational goals. Projects must have prior approval and supervision by Biomedical Equipment and Information Systems Technology faculty. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: Instructor Approval

## 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: AFM 092 or appropriate placement test score

**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: AFM 094 or MAT 120, and AFL 085, or appropriate placement test scores

**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: EET 131, and MAT 121 (minimum grade C) or appropriate placement test score

**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

**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 121 (minimum grade C) or appropriate placement test score

Ohio Transfer Assurance Guide Approved

Ohio Career-Technical 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: EET 131, and MAT 125 (minimum grade C) or appropriate placement test score

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 198 First Year Special Topics in Electronics Engineering Technology****1-9 Credits. 0 Lecture Hour. 0 Lab Hour.**

A course on selected topics related to Electronics Engineering Technology, which gives students opportunities to study information not currently covered in other courses. Grades issued are A, B, C, D, or F.

Prerequisites: Instructor Approval

**EET 199 First Year Independent Project in Electronics Engineering Technology****1-9 Credits. 0 Lecture Hour. 0 Lab Hour.**

A project related to Electronics Engineering Technology that is completed by one or more students to meet specific educational goals. Projects must have prior approval and supervision by Electronics Engineering Technology faculty. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: Instructor Approval

**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

**EET 298 Second Year Special Topics in Electronics Engineering Technology****1-9 Credits. 0 Lecture Hour. 0 Lab Hour.**

A course on selected topics related to Electronics Engineering Technology, which gives students opportunities to study information not currently covered in other courses. Grades issued are A, B, C, D, or F.

Prerequisites: Instructor Approval

**EET 299 Second Year Independent Project in Electronics Engineering Technology****1-9 Credits. 0 Lecture Hour. 0 Lab Hour.**

A project related to Electronics Engineering Technology that is completed by one or more students to meet specific educational goals. Projects must have prior approval and supervision by Electronics Engineering Technology faculty. Grades issued are Satisfactory or Unsatisfactory.

Prerequisites: Instructor Approval