

# ETM: ENERGY MANAGEMENT & CONTROLS TECHNOLOGY

Courses	Credit(s)	Contact	Lab
ETM 1600C. AUTOMATION AND CONTROLS FUNDAMENTALS.	3	2	2
AUTOMATION AND CONTROLS FUNDAMENTALS This course provides a general overview of the Energy Management and Controls Technology industry. Topics include history, building automation systems manufacturers and contractors, industry scope and trends, career pathways and the skills sets required, types of building automation systems, and general building automation systems architecture. (Special Fee \$64.00).			
ETM 1601C. HVAC SYSTEMS AND DEVICES.	3	2	2
HVAC SYSTEMS AND DEVICES This course will cover the major types of components found in Building Automation Systems (BAS). Topics include standard I/O wiring, temperature devices, humidity devices, pressure devices, flow devices, life & equipment safety devices, actuators & dampers, control valves, power supply devices, transducers, relays & contactors, motor controls, enclosures, and power monitoring devices. (Special Fee: \$64.00).			
ETM 1602C. AUTOMATED ELECTRICAL SYSTEMS AND DEVICES.	3	2	2
AUTOMATED ELECTRICAL SYSTEMS AND DEVICES Topics covered include power supplies, power distribution, circuit protection, electric motor theory, electric generator theory, types of electric motors, motor starters, switching devices, electrical symbols, pictorial diagrams, schematics, sequences of operation, basic electrical troubleshooting, voltage dividers, DC voltage & current sources, simplification theorems, AC current & voltage, oscilloscope fundamentals, reactive components & reactive circuits, basic filters, digital logic circuits, ladder logic, and shop drawings. (Special Fee: \$64.00).			
ETM 1603C. AUTOMATION AND CONTROLS DESIGN THROUGH COMMISSIONING.	3	2	2
AUTOMATION AND CONTROLS DESIGN THROUGH COMMISSIONING Prerequisites: ETM 1600C and ETM 1601C This course covers how building automation systems are designed and properly installed and commissioned. Topics include building controls system life cycle phases, component category, installation and maintenance scopes of work, primary controls project types, key milestone and sequences, execution bottlenecks, scopes of performance work, controls project roles, success strategies, public and private controls project funding methods, and contracting method impacts. (Special Fee: \$64.00).			
ETM 1604C. ENERGY MANAGEMENT CONCEPTS.	3	2	2
ENERGY MANAGEMENT CONCEPTS Prerequisite: ETM 1600C and ETM 1601C This course covers the impact of control systems and automation. Students will learn about the elements of a commercial energy audit. Students will also learn energy strategies involving lighting, HVAC, chiller plants, and boilers. (Special Fee: \$64.00).			

ETM 2010C. MECHANICAL MEASUREMENT AND INSTRUMENTATION. 3 2 2

MECHANICAL MEASUREMENT AND INSTRUMENTATION This course expands the foundation for both mechanical and electronic measurement techniques used in manufacturing environments. The course will integrate the concepts, principles, and techniques of mechanical measurement with the use of various types of instruments including micrometers, verniers, calipers, gauges, and other types of measuring equipment. The course will also introduce the student to the basic measurement techniques employing electronic test equipment including the operation and usage of digital multimeters, function generators, and oscilloscopes. (Special Fee: \$43.00).

ETM 2315C. HYDRAULICS AND PNEUMATICS. 3 3 1

HYDRAULICS AND PNEUMATICS Prerequisite: ETM 2010C This course is an introduction to the basic hydraulic and pneumatic systems and devices found in advanced manufacturing facilities. Underlying scientific principles and their practical applications are covered. The laboratory work will reinforce the principles learned through hands-on experiments. (Special Fee: \$54.00).

ETM 2605C. AUTOMATION AND CONTROLS INTEGRATION. 3 2 2

AUTOMATION AND CONTROLS INTEGRATION Prerequisite: ETM 2606C This course investigates several building automation systems integration platforms present in the industry. Topics include: Modbus, LonWorks, and BACnet. (Special Fee: \$64.00).

ETM 2606C. PROGRAMMING BUILDING AUTOMATION SYSTEMS. 3 2 2

PROGRAMMING BUILDING AUTOMATION SYSTEMS Prerequisite: ETM 1600C and ETM 1601C. This course will build upon programming concepts to prepare students for industry specific programming work required in the building automation industry. Concepts and theory will be applied to HVAC, Hydronic, Lighting and building specific sequences of operations in both line and block styles while becoming familiar with technical trends toward smart devices, question based programs and industry specific machine learning trends related to programs. (Special Fee: \$64.00).

ETM 2607C. TROUBLESHOOTING AUTOMATION AND CONTROL SYSTEMS. 3 2 2

TROUBLESHOOTING AUTOMATION AND CONTROL SYSTEMS Prerequisite: ETM 1602C or EET 1214C, ETM 1603C, ETM 2605C Students will learn the principles and procedures of triaging incidents and failure states and which troubleshooting techniques are required for problem resolution. Students will practice these techniques through case study exercise and live operations incident simulations. (Special Fee: \$64.00).

ETM 2608C. AUTOMATED BUILDING OPERATIONS. 3 2 2

AUTOMATED BUILDING OPERATIONS Prerequisite: ETM 1600C and ETM 1601C This course will provide students with the opportunity to experience software functionality in live building operations case studies from the point of view of the building owner. The theory of proper operations, maintenance and capital planning will be covered as it relates to building automation, controls and energy management. Students will learn to use and evaluate Building Automation Systems reports, schedules, alarms, trends, fault diagnostics and predictive maintenance techniques offered through user interface software within the building automation industry. (Special Fee: \$64.00).

ETM 2609C. CAPSTONE IN ENERGY MANAGEMENT AND CONTROLS TECHNOLOGY. 3 2 2

CAPSTONE IN ENERGY MANAGEMENT AND CONTROLS TECHNOLOGY  
Prerequisite: ETM 1604C, ETM 2607C, ETM 2608C This advanced course builds on prior knowledge to provide students with hands-on experience in the core aspects of building automation. Students will select a project and use lab equipment to design, install, program, and integrate building automation controllers. Key topics include installing building automation controllers, programming and integrating systems, troubleshooting automation issues, and commissioning building automation systems (BAS). Students will also focus on developing and implementing commissioning plans to ensure system performance and reliability. This capstone course is designed to prepare students for real-world applications in energy management, emphasizing technical expertise and system integration. (Special Fee: \$64.00).

ETM 2942. INTERNSHIP IN ENERGY MANAGEMENT AND CONTROLS TECHNOLOGY. 1-3 variable

INTERNSHIP IN ENERGY MANAGEMENT AND CONTROLS TECHNOLOGY  
Prerequisites: ETM 2607C This course allows a student to earn up to 3 credit hours of EMCT Internship over one or more semesters, to gain real-world experience by working in the field with one or more building automation systems related companies. One credit hour is equivalent to 80 clock hours of work. Three earned credits of internship requires a minimum of 240 clock hours of work spread out over one or more semesters. Multiple credit course. May be repeated for a maximum of 3 credits, but grade forgiveness cannot be applied.

ETM 2943. PRACTICUM IN ENERGY MANAGEMENT AND CONTROLS TECHNOLOGY. 3-15 variable

PRACTICUM IN ENERGY MANAGEMENT AND CONTROLS TECHNOLOGY  
This is a planned, hands-on, technical skill building experience that provides students with an opportunity to develop their commercial HVACR and Electrical skills set required to understand and control commercial building automation systems. Through an agency partner, this Practicum involves the successful completion of an A/C, Refrigeration and Heating Technician certification program, an Electrical related certification program, and/or BAS Technician related industry experience per Program Chair approval. 3 credits repeatable for maximum of 15 credit hours.