

ETM: ENERGY MANAGEMENT & CONTROLS TECHNOLOGY

Courses	Credit(s)	Contact	Lab
ETM 1600C. AUTOMATION AND CONTROLS FUNDAMENTALS. 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).	3	2	2
ETM 1601C. HVAC SYSTEMS AND DEVICES. 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).	3	2	2
ETM 1602C. AUTOMATED ELECTRICAL SYSTEMS AND DEVICES. AUTOMATED ELECTRICAL SYSTEMS AND DEVICES Prerequisites: ETM 1601C, and one of the following: PHY 1020, MAC 1105 or higher, MGF 1106, MGF 1107, STA 2023 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).	3	2	2
ETM 1603C. AUTOMATION AND CONTROLS DESIGN THROUGH COMMISSIONING. 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).	3	2	2
ETM 1604C. ENERGY MANAGEMENT CONCEPTS. ENERGY MANAGEMENT CONCEPTS Prerequisite: ETM 1600C and ETM 1601C This course covers the impact of control systems and automation. Students will learn about the basic elements of a commercial energy audit. Students will also learn energy strategies involving lighting, HVAC, chiller plants, and boilers. (Special Fee: \$64.00).	3	2	2
ETM 2010C. MECHANICAL MEASUREMENT AND INSTRUMENTATION. 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.	3	2	2
ETM 2315C. HYDRAULICS AND PNEUMATICS. 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.	3	3	1
ETM 2605C. AUTOMATION AND CONTROLS INTEGRATION. AUTOMATION AND CONTROLS INTEGRATION Prerequisite: ETM 1601C This course investigates several building automation systems integration platforms present in the industry. Topics include: Modbus, LonWorks, and BACnet. (Special Fee: \$64.00).	3	2	2
ETM 2606C. PROGRAMMING BUILDING AUTOMATION SYSTEMS. PROGRAMMING BUILDING AUTOMATION SYSTEMS Prerequisite: ETM 1601C, ETM 1602C This course will build upon basic programming concepts to prepare students for industry specific programming work required in the building automation industry. Basic 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).	3	2	2
ETM 2607C. TROUBLESHOOTING AUTOMATION AND CONTROL SYSTEMS. TROUBLESHOOTING AUTOMATION AND CONTROL SYSTEMS Prerequisite: ETM 1601C, ETM 1602C, 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).	3	2	2
ETM 2608C. AUTOMATED BUILDING OPERATIONS. 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 BAS reports, schedules, alarms, trends, basic fault diagnostics and predictive maintenance techniques offered through user interface software within the building automation industry. (Special Fee: \$64.00).	3	2	2

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

CAPSTONE IN ENERGY MANAGEMENT AND CONTROLS TECHNOLOGY

Prerequisite: ETM 2607C This course continues the development of how building automation systems are designed and properly installed and commissioned which was begun in ETM 1603C. Topics include developing a commissioning plan, building automation systems commissioning, and control theory. (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 1600C, ETM 1601C, and ETM 1603C This course allows the student to gain real-world experience by working with a local building automation systems company in the field for eight hours per week or alternatively, an equivalent number of hours on real-world automation projects at the college. Each earned credit of internship requires a minimum of 80 clock hours of work. Multiple credit course. May be repeated for maximum of 6 credits, but grade forgiveness cannot be applied.

ETM 2943. PRACTICUM IN ENERGY MANAGEMENT AND CONTROLS TECHNOLOGY. 3-12 variable

PRACTICUM IN ENERGY MANAGEMENT AND CONTROLS TECHNOLOGY

This is a planned hands-on, lab based, technical skill building experience that provides students with an opportunity to develop their commercial HVACR and Electrical skills set required to effectively understand and control building automation systems. This Practicum will involve the successful completion of a Refrigeration/Heating (A/C) Technician certification program, an Electricity certification program, or 3-12 credit hours of approved coursework per Program Chair approval.