

## Program Number 10-481-3 Associate Degree in Applied Science • Four Terms

### ABOUT THE PROGRAM

Energy expenses make up a part of every business' bottom line. Employers are seeking those skilled in monitoring energy consumption with the ability to detect and evaluate energy efficiency opportunities. Graduates of the Energy Management Technology associate degree program are equipped to lead business' energy management initiatives. Energy managers work within a variety of business sectors: utility companies; energy equipment companies; government agencies; and heating, ventilating, air conditioning and refrigeration contractors. Graduates may also find careers as energy auditors, energy management consultants, or energy program coordinators.

### PROGRAM OUTCOMES

- Evaluate the energy use patterns for commercial buildings and recommend energy efficiency and alternative energy solutions for high-energy consuming buildings.
- Troubleshoot, upgrade and maintain the Energy Management Systems (EMS); perform data recovery and backup duties.
- Monitor the efficiency of energy management operations, detecting, where possible, equipment failures.
- Construct energy evaluation technical reports and make presentations for potential project implementation.
- Upload and download information from remote and local networks to aid in the efficiency of energy management.
- Enhance energy management software and prepare program documentation and flow charts.
- Read and comprehend mechanical blueprints and control drawings.
- Respond to calls for heating, ventilating, air conditioning, and exterior lighting service independently; and determine whether to dispatch appropriate staff or to resolve problems remotely via the energy management system.
- Assist in the writing of specifications for additional energy management systems.
- Write technical proposals for energy projects.
- Provide training to campus users and facilities operations staff.

### ADMISSION TO DO'S

- Work with NWTC Admissions Specialist to:
  - Submit application and \$30 fee to NWTC.
  - Complete an assessment for placement (Accuplacer or ACT).
- Meet with NWTC program advisor to discuss program details.
- Meet with LTC program advisor to discuss program details.

### APPROXIMATE COSTS

- \$146 per credit (resident)
- \$205 per credit (out-of-state resident)
- Other fees vary by program (books, supplies, materials, tools, uniforms, health-related exams, etc.) Visit [gotoltc.edu/financial-aid/tuition-and-fees](http://gotoltc.edu/financial-aid/tuition-and-fees) for details.

### SPECIAL NOTE

This program is shared with Northeast Wisconsin Technical College (NWTC) in Green Bay. LTC students follow NWTC's admission process; however, they are able to attend 32 credits at the LTC Cleveland campus. This includes 20 credits in Terms 1 and 2, and 12 credits in Terms 3 and 4. The remainder of the courses noted with \*\* are held at NWTC's Green Bay campus.

### CAREER & EDUCATION ADVANCEMENT OPPORTUNITIES

LTC credits transfer to over 30 universities. For more information visit [gotoltc.edu/future-students/transfer](http://gotoltc.edu/future-students/transfer).

### CONTACT

NWTC:  
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Catalog No.	Class Title	Credit(s)
<b>Term 1</b>		
10660105	DC Fundamentals	2
10804115	College Tech Math 1	5
10809172	Introduction to Diversity Studies	3
10480101	Energy Intro-Renew & Sustain (Video-Stream Instruction at LTC)	4
10481114	Intro to Energy Management (Held at NWTC)	3
		<b>17</b>
<b>Term 2</b>		
10103131	Excel—Level 1	1
10103124	Intro to MS Project—Level 1	1
10660110	AC Fundamentals	2
10620138	Programmable Controllers - Allen Bradley	3
10801195	Written Communication	3
10481116	Building Automation Systems (BAS) Networking (Held at NWTC)	3
10605157	Power Electronics 1: Devices (Held at NWTC)	1
		<b>14</b>
<b>Term 3</b>		
10620220	Pumps: Intro to Fluid Moving Devices	1
10620164	Electromechanical Systems	2
10806154	General Physics 1	4
10403100	Blueprint Reading Intro (Held at NWTC)	1
10481109	Commercial HVACR Analysis (Held at NWTC)	3
10481111	Energy Control Strategies (Held at NWTC)	3
10481115	Lighting Fundamentals (Held at NWTC)	3
		<b>17</b>
<b>Term 4</b>		
10801196	Oral/Interpersonal Communication	3
10809198	Introduction to Psychology	3
10481107	Building Energy Simulation (Held at NWTC)	3
10481108	Commercial Energy Analysis (Held at NWTC)	3
10481110	Energy Accounting (Held at NWTC)	2
10481113	Energy Investment Analysis (Held at NWTC)	3
		<b>17</b>

**TOTAL 65**

Classes meet at LTC, unless noted to be held at NWTC.

Curriculum and Program Acceptance requirements are subject to change. Program start dates vary; check with your advisor for details. The tuition and fees are approximate based on 2018-2019 rates.



**AC FUNDAMENTALS**...prepares the student to analyze electrical circuits using AC math, analyze AC waveforms, measure and analyze AC power, analyze capacitors and inductors in DC and AC circuits, analyze AC circuits containing reactance and calculate resonance, apply the elements and properties of basic measuring circuits, and describe transformer characteristics. PREREQUISITES: 10660105 DC Fundamentals

**BLUE PRINT READING INTRO**...develop the knowledge skills process and understanding of site plans, footings and foundations, floor plans, elevations, below-grade piping, above-grade piping, isometric piping diagrams, schedules and details, electrical floor plans, lighting, ventilating, and air conditioning. Course Typically Offered: Fall

**BUILDING AUTOMATION SYSTEM (BAS) NETWORKING**...presents the fundamentals concepts of data transmission in various media types. Topics include network fundamentals, standards, OSI model, IP protocol, network signal transmission, media, protocols, physical topologies, logical topologies, hardware, typical BAS networks, and typical BAS subnetworks.

**BUILDING ENERGY SIMULATION**...course covers the variety of computer programs available for analyzing the energy performance of commercial buildings including BIN methodology, hourly simulations and an overview of current programs on the market such as RETScreen and eQuest. PREREQUISITES: 10-481-109, Commercial HVACR Systems Analysis; 10-481-111, Energy Control Strategies; 10-481-115, Lighting Fundamentals. See more at: <https://classcart.nwtc.edu/Classes/Details?courseId=636#sthash.TVCiLnXc.dpuf>

**COLLEGE TECHNICAL MATH 1**...prepares the student to solve linear, quadratic, and rational equations; graphing; formula rearrangement; solve systems of equations; percent; proportions; measurement systems; computational geometry; right and oblique triangle trigonometry; trigonometric functions on the unit circle; and operations on polynomials. Emphasis will be on the application of skills to technical problems. This course is the equivalent of successful completion of College Tech Math 1a and 1b. PREREQUISITES: 10834110 Elementary Algebra w Apps or 31457318 Ind MtnC Trades Math or 31420320 Machine Tool Math or equivalent.

**COMMERCIAL ENERGY ANALYSIS**...emphasis is on the analysis of energy use in commercial buildings including utility bill analysis, audit data, identifying energy efficiency measures, energy savings and investment calculations, audit report writing. PREREQUISITE: 10-481-109, Commercial HVACR Systems Analysis; 10-481-111, Energy Control Strategies, 10-481-115, Lighting Fundamentals. See more at: <https://classcart.nwtc.edu/Classes/Details?courseId=637#sthash.CM5sAh93.dpuf>

**COMMERCIAL HVACR ANALYSIS**...identify commercial HVAC system types and the general energy use impact of each type. Calculations of system equipment efficiencies will be used to determine EER, SEER, AFUE, COP, combination and seasonal efficiency in boilers, balance point partial efficiency, BIN analysis. PREREQUISITE: 10-481-114, Intro to Energy Management

**DC FUNDAMENTALS**...prepares the student to convert values to scientific and engineering notations; calculate math quantities; describe basic atomic theory; identify basic electrical terms; use established symbols standards; describe DC voltage characteristics and current sources and electrical resistance; measure and analyze electrical quantities in series and parallel circuits; and desolder/solder single lead components. COREQUISITES: 10804115 College Technical Math 1 or 10804113 College Tech Math 1A and 10804114 College Tech Math 1B

**ELECTROMECHANICAL SYSTEMS**...prepares the student to communicate with, tune, run, and troubleshoot Allen-Bradley servos; utilize electrical control of hydraulic systems, explore PID control of motor speed; and investigate open and closed loop control systems. PREREQUISITES: Fluid Power 2 and 10660110 AC Fundamentals

**ENERGY ACCOUNTING**...review of energy units, data gathering for energy accounting utility rates and schedules, energy data organization, adjusted baselines, cost avoidance, load factor, data analysis, data presentation, use of utility energy accounting software. PREREQUISITES: 10-481-109, Commercial HVACR Systems Analysis; 10-481-111, Energy Control Strategies, 10-481-115, Lighting Fundamentals. See more at: <https://classcart.nwtc.edu/Classes/Details?courseId=638#sthash.yHO1uCif.dpuf>

**ENERGY CONTROL STRATEGIES**...topics include building system control concepts and devices; including electric, pneumatic and digital controls, emphasis is placed on identifying and understanding control strategies related to energy using systems and methods to estimate energy savings. PREREQUISITE: 10-481-114, Intro to Energy Management. Course Typically Offered: Fall

**ENERGY-INTRO RENEW & SUSTAIN**...an overview of various renewable energy technologies and sustainable design practices and their current applications. Emphasis will be placed on policies, renewable energy production, green products and jobs. Course Typically Offered: Fall/Spring

**ENERGY INVESTMENT ANALYSIS**...emphasis on simple payback and life-cycle cost analysis, time value of money, cash flow equivalence, cost-benefit analysis, tax credits, depreciation, inflation and/or escalating fuel costs on energy investments and cost estimating. PREREQUISITES: 10-481-109, Commercial HVACR Systems Analysis; 10-481-111, Energy Control Strategies, 10-481-115, Lighting Fundamentals. See more at: <https://classcart.nwtc.edu/Classes/Details?courseId=737#sthash.2K0NFtq0.dpuf>

**EXCEL - LEVEL 1**...introduces the student to creating, modifying and formatting worksheets; entering formulas and functions; working with charts; and developing multiple-sheet workbooks. This course is offered in a self-paced format.

**GENERAL PHYSICS 1**...presents the applications and theory of basic physics principles. This course emphasizes problem-solving, laboratory investigation, and applications. Topics include unit conversions and analysis, vectors, translational and rotational kinematics, translational and rotational dynamics, heat and temperature, and harmonic motion and waves. COREQUISITE: 10804197 College Tech Math 1B or 10804114 College Tech Math 1B or 10804114M1 College Tech Math 1B Mod 1 & 10804114M2 College Tech Math 1B Mod 2 or 10804115 College Tech Math 1

**INTRODUCTION TO DIVERSITY STUDIES**...introduces learners to the study of diversity from a local to a global environment using a holistic, interdisciplinary approach. Encourages self-exploration and prepares the learner to work in a diverse environment. In addition to an analysis of majority/minority relations in a multicultural context, the primary topics of race, ethnicity, age, gender, class, sexual orientation, disability, religion are explored. COREQUISITE: 10838105 Intro Reading and Study Skills or equivalent

**INTRO TO ENERGY MANAGEMENT**...introduces the basic concepts of energy, utility systems and utility rate structures; defines the need for energy management as an integral part of society at all levels. The course will present the various opportunities available to energy management students. Course Typically Offered: Fall

**INTRO TO MS PROJECT - LEVEL 1**...is a software tool used to enter, analyze, track, and summarize information about a project. This course prepares the learner to enter and edit tasks, durations, task dependencies, and lag and lead times. The learner will use the project time scale and calendar, review project statistics, work with a network diagram, create and assign resources, and track the progress of a project. This class is offered in a self-paced format.

**INTRODUCTION TO PSYCHOLOGY**...introduces students to a survey of the multiple aspects of human behavior. It involves a survey of the theoretical foundations of human functioning in such areas as learning, motivation, emotions, personality, deviance and pathology, physiological factors, and social influences. It directs the student to an insightful understanding of the complexities of human relationships in personal, social, and vocational settings. COREQUISITE: 10838105 Intro Reading and Study Skills or equivalent

**LIGHTING FUNDAMENTALS**...light sources, luminaries, lighting controls, manufacturer lamp and ballast specifications, lighting power density, lighting-HVAC interactions, retrofit opportunities, cost savings analysis and lighting codes/regulations. Students will critically evaluate lighting systems, luminaries and associated components. Understand and perform various types of lighting calculations. PREREQUISITE: 10-481-114, Intro to Energy Management. Course Typically Offered: Fall

**ORAL/INTERPERSONAL COMMUNICATIONS**...provides students with the skills to develop speaking, verbal and nonverbal communication, and listening skills through individual speeches, group activities, and other projects. COREQUISITE: 10838105 Intro Reading and Study Skills or equivalent

**POWER ELECTRONICS 1: DEVICES**...the device characteristics and applications of thyristors, power transistors, and switching devices.

**PROGRAMMABLE CONTROLLERS - ALLEN BRADLEY**...prepares the student to understand basic PLC structure and terminology; learn to create and troubleshoot basic PLC programs using the RSLOGIX 500 software and the RSLINX communication software; become familiar with communicating with programming SLC-500 and Micrologix PLCs. This course is highly computer based.

**PUMPS: INTRO TO FLUID MOVING DEVICES**...this course provides the opportunity for the learner to develop the knowledge, skills, and understanding of pumps, the different classifications of pumps, the inner workings, general maintenance and pumping theory.

**WRITTEN COMMUNICATION**...teaches the writing process, which includes prewriting, drafting, revising, and editing. Through a variety of writing assignments, the student will analyze audience and purpose, research and organize ideas, and format and design documents based on subject matter and content. Keyboarding skills are required for this course. It also develops critical reading and thinking skills through the analysis of a variety of written documents. PREREQUISITE: 10831103 Intro to College Wrtg equivalent and COREQUISITE: 10838105 Intro Rdg & Study Skills or equivalent