



Course Number and Title: NRG 101- Introduction to Energy Management

Campus Location:

Georgetown, Dover, Stanton

Effective Date:

2017-51

Prerequisite:

MAT 010, ENG 090 or ENG 091, SSC 100 or concurrent

Co-Requisites:

None

Course Credits and Hours:

3.00 credits

2.00 lecture hours/week

2.00 lab hours/week

Course Description:

This course is an introduction to the practice of energy management. Specific topics include career opportunities, working in teams, introduction to renewable and nonrenewable energy sources, energy end uses, unit conversion, basic energy physics, solving energy efficiency problems, and use of calculators and computers as tools for solving these problems.

Required Text(s):

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:

Scientific calculator (preferably TI-83+ or TI-84+), Notebook

Schedule Type:

Classroom Course

Hybrid Course

Online Course

Disclaimer:

None

Core Course Performance Objectives (CCPOs):

1. Define the role of energy management professionals in the workforce. (CCC 1, 4, 5; PGC NRG 7, SOL 5)
2. Recall the major worldwide energy sources and uses, particularly those used in the United States and Delaware. (CCC1, 2, 5; PGC NRG 4, 5, 7 SOL 3, 5, BAS 3)
3. Use basic skills and knowledge to solve energy management problems. (CCC 2, 3, 5, 6; PGC NRG 3, 4, 5, 7, SOL 2, 3, 5, BAS 3)
4. Evaluate the energy use of several common devices and compare with alternatives. (CCC 1, 2, 3, 6; PGC NRG 4, 5, 7, SOL 3, 5, BAS 3)
5. Review common energy efficiency and renewable energy technologies. (CCC 5, 6; PGC NRG 1, 2, 3, 7, SOL 1, 2, 5, BAS 1, 2, 3)
6. Operate or interpret equipment, including electricity meters, light meters, and temperature sensors. (CCC 3, 6; PGC NRG 1, 2, SOL 1, BAS 1)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):

Upon completion of this course, the student will:

1. Define the role of energy management professionals in the workforce.
 1. Identify and explain the major roles and job functions of energy management professionals.
 2. Identify and explain the major career options for energy management professionals.
 3. Explore energy management job opportunities by performing an informational interview with an energy management professional.
 4. Identify professional associations and industry publications related to the field.
2. Recall the major worldwide energy sources and uses, particularly the United States and Delaware.
 1. Locate and use energy data on the Internet.
 2. Interpret data presented in charts, graphs, and tables.
 3. Compare and contrast the energy sources and usage of the world, the United States, and Delaware.
3. Use basic skills and knowledge needed for energy management problems.
 1. Solve unit conversion problems using factor-label method.
 2. Explain temperature, pressure, and volume and their relationships.
 3. Convert from scientific notation to engineering notation.
 4. Recall higher heating value and lower heating value, cost, and quantity measurements of fuels.
 5. Describe the relationship among electric power, energy, voltage, and current.
 6. Discuss heat transfer mechanisms, and explain how and when they occur.
 7. Differentiate power and energy and their units of measurements.
 8. Describe the Carnot cycle and its implications for thermal efficiency.
 9. Explain how energy usage affects emissions footprint.
 10. Explain benchmarking and how it is used in energy management.
 11. Define *sensible heat* and *latent heat*.
 12. Explain how systems thinking can benefit the energy manager.
 13. Describe basic financial drivers of renewable energy systems, including power purchase agreements, feed in tariffs, and capacity rebates.
4. Evaluate the energy use of several common devices and compare with alternatives.
 1. Measure energy and power of common household devices.
 2. Compare alternative devices in terms of energy use, upfront cost, and lifetime.
 3. Propose the best device for a certain function, including economic justification.
5. Review common energy efficiency and renewable energy technologies.
 1. Identify common energy efficiency technologies, including technologies in lighting, heating/ventilation/air conditioning (HVAC), and building envelope.
 2. Identify common renewable energy technologies and their resource availability, including wind, solar thermal, and photovoltaics.
 3. Compare the costs of energy efficiency measures with renewable energy production.
6. Operate or interpret equipment, including electricity meters, light meters, and temperature sensors.
 1. Operate electricity measuring devices to measure current, voltage, power, and energy.
 2. Operate a light meter to determine appropriate lighting levels in a room.
 3. Operate dry and wet bulb thermometers to determine temperature.
 4. Analyze utility bills and meters.

Evaluation Criteria/Policies:

Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	-	100	=	A
83	-	91	=	B
75	-	82	=	C
0	-	74	=	F

Students should refer to the [Student Handbook - https://www.dtcc.edu/handbook](https://www.dtcc.edu/handbook) for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):
Energy Management

1. Utilize building system and energy technology hardware and software to gather data on building lighting systems operation and energy consumption.
2. Utilize building system and energy technology hardware and software to gather data on heating, ventilation, and air conditioning (HVAC) systems operation and energy consumption.
3. Calculate, analyze, and verify the energy use of buildings based upon the interaction of energy consuming building systems.
4. Evaluate residential buildings and make recommendations for optimized building performance and occupant comfort.
5. Evaluate commercial buildings and make recommendations for optimized building performance and occupant comfort.
6. Construct and present technical reports.
7. Analyze the economic, environmental, and business implications of potential energy measures.

Renewable Energy Solar

1. Utilize building system and energy technology hardware and software to gather data on building lighting systems operation and energy consumption.
2. Calculate, analyze, and verify the energy use of buildings based upon the interaction of energy consuming building systems.
3. Evaluate residential buildings and make recommendations for optimized building performance and occupant comfort.
4. Evaluate commercial buildings and make recommendations for optimized building performance and occupant comfort.
5. Construct and present technical reports.
6. Analyze the economic, environmental, and business implications of potential energy measures.
7. Perform preliminary and in depth site and customer suitability evaluation of potential applications for solar use.
8. Design and calculate output of optimal site-specific array by deriving panel configuration and specifying components.

Building Automation Systems

1. Utilize building system and energy technology hardware and software to gather data on building lighting systems operation and energy consumption.
2. Utilize building system and energy technology hardware and software to gather data on heating, ventilation, and air conditioning (HVAC) systems operation and energy consumption.
3. Evaluate commercial buildings and make recommendations for optimized building performance and occupant comfort.
4. Construct and present technical reports.
5. Assemble, install, service, and repair direct digital controls (DDC) for building electrical and mechanical systems.
6. Program and explain operational sequences for building equipment and systems.
7. Integrate and commission building systems and components to ensure reliable performance and compliance with building codes.

Disabilities Support Statement:

The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the [disabilities services - https://www.dtcc.edu/disabilitysupport](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.