



Western Technical College

10481100 Introduction to Energy Efficiency & Management

Course Outcome Summary

Course Information

Description	Students in this course will be introduced to the principles of energy management and the energy industry. Students will learn about the history of energy production and costs, the dynamics of worldwide energy consumption and growth, the principle methods by which energy is used, and its environmental and financial impacts and consequences. Objectives and components of an effective energy management program are explored. In addition, students will be introduced to the use of building diagnostic tools commonly employed in industry.
Career Cluster	Architecture and Construction
Instructional Level	Associate Degree Courses
Total Credits	3
Total Hours	54

Textbooks

Energy: Management, Supply and Conversation. 2nd Edition. Copyright 2009. Beggs, Clive. Publisher: Taylor & Francis. **ISBN-13:** 978-0-7506-8670-9. Required.

Success Abilities

1. Cultivate Passion: Enhance Personal Connections
2. Cultivate Passion: Expand a Growth-Mindset
3. Cultivate Passion: Increase Self-Awareness
4. Live Responsibly: Develop Resilience
5. Live Responsibly: Embrace Sustainability
6. Live Responsibly: Foster Accountability
7. Refine Professionalism: Act Ethically
8. Refine Professionalism: Improve Critical Thinking
9. Refine Professionalism: Participate Collaboratively

10. Refine Professionalism: Practice Effective Communication

Course Competencies

1. Examine economic and political impact of energy use

Assessment Strategies

- 1.1. Project
- 1.2. Presentation

Criteria

You will know you are successful when

- 1.1. You identify the energy transport costs
- 1.2. You describe energy production
- 1.3. You explain the political effects of the imbalance of production and consumption
- 1.4. You describe energy consumption
- 1.5. You identify issues with imbalance of energy production and consumption

Learning Objectives

- 1.a. Analyze the costs of developing and transporting energy
- 1.b. Explore the balance and imbalance of energy production and consumption
- 1.c. Examine the political impacts of energy use

2. Identify the environmental impacts of different energy sources.

Assessment Strategies

- 2.1. Presentation
- 2.2. Report

Criteria

You will know you are successful when

- 2.1. You identify two renewable energy sources
- 2.2. You identify two nuclear energy sources
- 2.3. You identify five carbon based energy sources
- 2.4. You describe the environmental impacts of renewable energy
- 2.5. You describe the environmental impacts of carbon based energy
- 2.6. You describe the environmental impacts of nuclear based energy

Learning Objectives

- 2.a. Investigate carbon based energy
- 2.b. Investigate nuclear energy
- 2.c. Explore renewable energy

3. Explore energy management systems

Assessment Strategies

- 3.1. Presentation

Criteria

You will know you are successful when

- 3.1. You describe two different types of energy management systems
- 3.2. You explain the implementation of an energy management systems into an existing building system
- 3.3. You choose an appropriate energy management system for a new building system

Learning Objectives

- 3.a. Investigate energy controls
- 3.b. Select site specific appropriate controls

4. Explore properties of energy

Assessment Strategies

- 4.1. Report

4.2. Presentation

Criteria

You will know you are successful when

- 4.1. You explain laws of thermodynamics
- 4.2. You explain properties of electricity
- 4.3. You describe the types of heating and cooling systems
- 4.4. You explain how energy relates to comfort
- 4.5. You describe the thermal properties of building components

Learning Objectives

- 4.a. Classify energy types
- 4.b. Investigate energy interactions with building materials
- 4.c. Explore laws of thermodynamics
- 4.d. Identify types of heat flow
- 4.e. Relate energy to comfort
- 4.f. Explore electrical systems

5. Evaluate energy use in building systems

Assessment Strategies

- 5.1. Presentation
- 5.2. Report

Criteria

You will know you are successful when

- 5.1. You define energy use patterns
- 5.2. You calculate energy usage
- 5.3. You calculate energy costs
- 5.4. You calculate projected energy use
- 5.5. You calculate projected energy costs
- 5.6. You explain energy saving options

Learning Objectives

- 5.a. Examine utility bills
- 5.b. Summarize energy use
- 5.c. Categorize energy use

6. Identify energy reduction opportunities and strategies

Assessment Strategies

- 6.1. Project
- 6.2. Report

Criteria

You will know you are successful when

- 6.1. You calculate potential energy use reductions
- 6.2. You identify site specific energy reduction interventions
- 6.3. You calculate return on investment for various interventions
- 6.4. You prepare an energy use reduction plan
- 6.5. You explain energy use reduction strategies

Learning Objectives

- 6.a. Examine heating and cooling systems
- 6.b. Identify occupant energy use
- 6.c. Investigate energy saving strategies
- 6.d. Explore energy saving plans

7. Examine energy management integration into building systems.

Assessment Strategies

- 7.1. Project
- 7.2. Presentation

Criteria

You will know you are successful when

- 7.1. You describe how site selection affects energy efficiency
- 7.2. You identify energy efficient design features
- 7.3. You identify energy efficient mechanical systems
- 7.4. You describe energy management integration into existing buildings

Learning Objectives

- 7.a. Explore energy efficient building design
- 7.b. Explore energy efficient heating and cooling systems
- 7.c. Explore energy efficient retrofits
- 7.d. Explore energy efficient building techniques

8. Examine global production and consumption of energy.

Assessment Strategies

- 8.1. Reflection

Criteria

You will know you are successful when

- 8.1. You identify global energy producers
- 8.2. You describe energy transportation issues
- 8.3. You identify three major global energy consumers
- 8.4. You describe global energy consumption levels

Learning Objectives

- 8.a. Explore history of domestic energy use
- 8.b. Explore global energy consumption
- 8.c. Investigate global energy reserves

9. Explain the role of Energy Service Companies in the energy industry

Assessment Strategies

- 9.1. Reflection

Criteria

You will know you are successful when

- 9.1. You describe the limits of professional competency
- 9.2. You identify professional career options
- 9.3. You identify the environmental and economic value and benefits that Energy Service Professionals provide

Learning Objectives

- 9.a. Identify capabilities of Energy Service Companies
- 9.b. Explore employment opportunities in the energy management and energy services industries
- 9.c. Identify the economic and environmental benefits Energy Service Companies provide