



Western Technical College

10481108 Energy Modeling 2

Course Outcome Summary

Course Information

Description	Students will explore in depth heat loss estimation, energy simulation, and energy optimization. They will also study building durability as it relates to residential and commercial projects. The software used to perform analysis will include: WUFI, THERM, REMrate, BEopt, and eQUEST.
Career Cluster	Architecture and Construction
Instructional Level	Associate Degree Courses
Total Credits	3
Total Hours	54

Pre/Corequisites

Prerequisite 10481105 Energy Modeling 1

Textbooks

No textbook required.

Success Abilities

1. Cultivate Passion: Expand a Growth-Mindset
2. Cultivate Passion: Increase Self-Awareness
3. Live Responsibly: Embrace Sustainability
4. Live Responsibly: Foster Accountability
5. Refine Professionalism: Act Ethically
6. Refine Professionalism: Improve Critical Thinking
7. Refine Professionalism: Participate Collaboratively
8. Refine Professionalism: Practice Effective Communication

Course Competencies

1. Determine heating and cooling loads associated with buildings.

Assessment Strategies

- 1.1. Project
- 1.2. Case Study

Criteria

You will know you are successful when

- 1.1. you calculate heating loads in residential buildings.
- 1.2. you calculate heating loads in commercial buildings.
- 1.3. you calculate ventilation rates in residential buildings.
- 1.4. you calculate ventilation rates in commercial buildings.
- 1.5. you calculate cooling loads in residential buildings.
- 1.6. you calculate cooling loads in commercial buildings.

Learning Objectives

- 1.a. Evaluate heating loads.
- 1.b. Evaluate cooling loads.
- 1.c. Ensure proper ventilation rates.
- 1.d. Practice calculations for all loads.

2. Estimate appliance and plug loads associated with buildings.

Assessment Strategies

- 2.1. Project
- 2.2. Case Study

Criteria

You will know you are successful when

- 2.1. you calculate plug and appliance loads for a residential building.
- 2.2. you calculate plug and appliance loads for a commercial building.
- 2.3. you calculate plug and appliance loads using utility billing information
- 2.4. you calculate plug and appliance loads using energy modeling software.
- 2.5. you discern the energy consumption of typical plug and appliance loads.

Learning Objectives

- 2.a. Determine appliance and plug loads using utility billing information.
- 2.b. Determine appliance and plug load using energy modeling software.
- 2.c. Practice calculations for all loads.

3. Determine lighting loads associated with buildings.

Assessment Strategies

- 3.1. Project
- 3.2. Case Study
- 3.3. Report

Criteria

You will know you are successful when

- 3.1. you count total light fixtures.
- 3.2. you identify lighting controls.
- 3.3. you establish lighting usage patterns.
- 3.4. you monitor lighting using meters.

Learning Objectives

- 3.a. Determine lighting loads using utility billing information.
- 3.b. Determine lighting loads using energy modeling software.
- 3.c. Identify equipment and components associated with lighting loads.

4. Evaluate envelope assemblies associated with buildings.

Assessment Strategies

- 4.1. Case Study
- 4.2. Project
- 4.3. Report

Criteria

You will know you are successful when

- 4.1. you identify building materials in roof assemblies.
- 4.2. you identify building materials in wall assemblies.
- 4.3. you identify building materials in below grade assemblies.
- 4.4. you identify air management layers in assemblies.
- 4.5. you identify moisture management layers in assemblies.
- 4.6. you calculate R-value of layers in assemblies.

Learning Objectives

- 4.a. Evaluate envelope assemblies using energy modeling software.
- 4.b. Evaluate envelope assemblies using moisture modeling software.
- 4.c. Analyze envelope assemblies using building science principles.
- 4.d. Identify components associated with building envelope assemblies.

5. Determine total energy consumption associated with buildings.

Assessment Strategies

- 5.1. Case Study
- 5.2. Project
- 5.3. Report

Criteria

You will know you are successful when

- 5.1. you calculate energy consumption using utility billing information.
- 5.2. you calculate energy consumption using energy modeling software.
- 5.3. you calculate energy use intensity.
- 5.4. you establish energy consumption using meters.

Learning Objectives

- 5.a. Summarize total energy consumption in buildings using utility billing information.
- 5.b. Summarize total energy consumption in buildings using energy modeling software.
- 5.c. Identify energy sources associated with building energy consumption.

6. Recommend energy conservation measures.

Assessment Strategies

- 6.1. Case Study
- 6.2. Project
- 6.3. Report

Criteria

You will know you are successful when

- 6.1. you identify cost effective energy conservation measures.
- 6.2. you calculate the costs of energy conservation measures.
- 6.3. you calculate the energy savings of energy conservation measures.
- 6.4. you determine the costs of electricity.
- 6.5. you determine the costs of natural gas.
- 6.6. you determine the costs of biofuels.
- 6.7. you calculate energy produced from renewable energy production.

Learning Objectives

- 6.a. Summarize costs associated with energy conservation measures.

- 6.b. Determine energy savings associated with energy conservation measures.
- 6.c. Compare cost effectiveness of energy conservation measures.