



Western Technical College

10614115 Building Science & Materials

Course Outcome Summary

Course Information

Description	Students will study the concepts associated with the theory, materials, and methods used in construction to include footings and foundations, walls, floors, roofs and roof materials, exterior finishes, interior walls, ceiling and floor finishes, insulation types, vapor and air infiltration, sound protection and building codes. Additionally, student will become familiar with blueprint reading and examine all the trades associated with construction including: electrical, HVAC, and plumbing.
Career Cluster	Architecture and Construction
Instructional Level	Associate Degree Courses
Total Credits	3
Total Hours	72

Textbooks

Green from the Ground Up: Sustainable, Healthy, and Energy-Efficient Home Construction. Copyright 2008. Gibson, Scott and David Johnston. Publisher: Ingram Publisher Services. **ISBN-13:**978-1-56158-973-9. Required.

Success Abilities

1. Cultivate Passion: Expand a Growth-Mindset
2. Live Responsibly: Embrace Sustainability

High Impact Practices

1. Community Based Learning Project: a key learning outcome of this course is to connect academic learning and civic development while simultaneously addressing a community partner's needs, interests, or problems.

Program Outcomes

1. Evaluate building materials
2. Integrate building systems

Course Competencies

1. Explore materials used for architectural openings.

Assessment Strategies

- 1.1. Project

Criteria

You will know you are successful when

- 1.1. You identify materials used in window assemblies
- 1.2. You identify materials used in door assemblies
- 1.3. You identify window specifications from NFRC labels
- 1.4. you identify types of architectural openings.

Learning Objectives

- 1.a. Describe Shading Coefficient.
- 1.b. Describe transmission of glazing.
- 1.c. Describe importance of the U-Value of glazing.
- 1.d. Compare different window types for energy efficiency.

2. Examine the properties of moisture.

Assessment Strategies

- 2.1. Simulation
- 2.2. Drawing/Illustration

Criteria

You will know you are successful when

- 2.1. You analyze three different building assemblies using hygrothermal modeling software
- 2.2. You determine vapor permeability of common building materials
- 2.3. You understand moisture movements through building assemblies
- 2.4. You identify effective drainage planes

Learning Objectives

- 2.a. Describe moisture interactions with building materials
- 2.b. Determine vapor permeability of building materials
- 2.c. Predict moisture movements in building assemblies

3. Examine the properties of energy

Assessment Strategies

- 3.1. Simulation
- 3.2. Presentation

Criteria

You will know you are successful when

- 3.1. You calculate the R-value of building assemblies
- 3.2. You identify energy with infrared imaging
- 3.3. You determine the embodied energy of building materials

Learning Objectives

- 3.a. Describe energy interactions with building materials
- 3.b. Explain how energy is transferred
- 3.c. Understand the laws of thermodynamics

4. Examine sustainable building principles

Assessment Strategies

- 4.1. Case Study

Criteria

You will know you are successful when

- 4.1. You determine energy consumption per square foot
- 4.2. You calculate the embodied energy of building materials
- 4.3. You identify on site renewable energy generation
- 4.4. You identify sustainable building materials
- 4.5. You identify sustainable building practices

Learning Objectives

- 4.a. Explore recycled, repurposed and reused building materials
- 4.b. Determine the embodied energy in building materials
- 4.c. Choose sustainably sourced building materials

5. Examine sustainable building standards

Assessment Strategies

- 5.1. Demonstration

Criteria

You will know you are successful when

- 5.1. You determine points earned for sustainable building practices
- 5.2. You verify LEED points for a building project
- 5.3. You verify GreenStar points for a building project
- 5.4. You document sustainable building practices on a spreadsheet

Learning Objectives

- 5.a. Examine building codes
- 5.b. Explore point based building standards
- 5.c. Explore performance based building standards

6. Explore foundation assemblies

Assessment Strategies

- 6.1. Drawing/Illustration
- 6.2. Presentation
- 6.3. Case Study

Criteria

You will know you are successful when

- 6.1. You identify footings on construction documents
- 6.2. You identify below grade walls on construction documents
- 6.3. You determine the r-value of foundation assemblies
- 6.4. You determine moisture interactions with foundation assemblies

Learning Objectives

- 6.a. Examine footings
- 6.b. Identify below grade wall assemblies
- 6.c. Summarize moisture challenges in foundations
- 6.d. Summarize energy challenges in foundations

7. Explore wall assemblies

Assessment Strategies

- 7.1. Drawing/Illustration
- 7.2. Case Study
- 7.3. Presentation

Criteria

You will know you are successful when

- 7.1. You identify wall framing components
- 7.2. You identify structural insulated panels
- 7.3. You identify air tight layers
- 7.4. You identify thermal layers
- 7.5. You calculate the r-value of wall assemblies

Learning Objectives

- 7.a. Identify wall assemblies
- 7.b. Examine wall, floor, foundation connections
- 7.c. Summarize moisture issues in above grade wall assemblies
- 7.d. Summarize energy issues in above grade wall assemblies

8. Explore roof assemblies

Assessment Strategies

- 8.1. Presentation
- 8.2. Case Study
- 8.3. Drawing/Illustration

Criteria

You will know you are successful when

- 8.1. You identify roof coverings on construction documents
- 8.2. You identify roof framing components on construction documents
- 8.3. You identify air tight layers on construction documents
- 8.4. You identify moisture control layers on construction documents
- 8.5. You calculate the r-value of roof assemblies
- 8.6. You identify liquid water management layers on construction documents.

Learning Objectives

- 8.a. Identify roof assemblies
- 8.b. Examine roof-wall connections
- 8.c. Summarize moisture issues in roof assemblies
- 8.d. Summarize energy issues in roof assemblies