



Western Technical College

10614135 Structural Analysis

Course Outcome Summary

Course Information

Description	This course is designed to introduce the principles of structural mechanics to architectural students at a technical level. Students will develop an understanding of the structural analysis process, materials and systems. Basic calculations will be performed for beam analysis, external and internal forces on beams and beam and column design.
Career Cluster	Architecture and Construction
Instructional Level	Associate Degree Courses
Total Credits	3
Total Hours	54

Textbooks

No textbook required.

Learner Supplies

Architectural Technology Kit. **Vendor:** Campus Shop. Required.

Success Abilities

1. Live Responsibly: Foster Accountability
2. Refine Professionalism: Participate Collaboratively

Program Outcomes

1. Develop construction documents.
2. Evaluate building materials.
3. Develop building designs.
4. Integrate building systems.

5. Apply structural principles in all phases of an architectural project.

Course Competencies

1. Analyze structural loads.

Assessment Strategies

- 1.1. Written Product

Criteria

You will know you are successful when

- 1.1. you classify load types.
- 1.2. you characterize loads as dead or live loads.
- 1.3. you determine tributary area.
- 1.4. you calculate loading.
- 1.5. you determine load path.

Learning Objectives

- 1.a. Classify load types.
- 1.b. Characterize loads as dead or live loads.
- 1.c. Determine tributary area.
- 1.d. Calculate loading.
- 1.e. Determine load path.

2. Compare structural characteristics of materials.

Assessment Strategies

- 2.1. Written Product

Criteria

You will know you are successful when

- 2.1. you compare basic properties of wood, steel and concrete.
- 2.2. you differentiate between ductile and brittle materials.
- 2.3. you explain concept of factor of safety.
- 2.4. you explain concepts of dimensional stability and thermal expansion.

Learning Objectives

- 2.a. Compare basic properties of wood, steel and concrete.
- 2.b. Differentiate between ductile and brittle materials.
- 2.c. Explore concept of factor of safety.
- 2.d. Examine concepts of dimensional stability and thermal expansion.

3. Apply formulas for stress, strain, stiffness.

Assessment Strategies

- 3.1. Written Product

Criteria

You will know you are successful when

- 3.1. you determine stress on a structural element.
- 3.2. you explain concept of modulus of elasticity.
- 3.3. you determine strain resulting from stress on a structural element.

Learning Objectives

- 3.a. Define stress, strain, and stiffness according to industry standards.
- 3.b. Determine stress on a structural element.
- 3.c. Determine strain resulting from stress on a structural element.
- 3.d. Identify concept of modulus of elasticity.

4. Determine basic properties of forces and moments.

Assessment Strategies

4.1. Written Product

Criteria

You will know you are successful when

- 4.1. you determine resultant from adding forces.
- 4.2. you resolve force into its horizontal and vertical components,
- 4.3. you explain concept of moment.
- 4.4. you calculate moment.

Learning Objectives

- 4.a. Determine resultant from adding forces.
- 4.b. Resolve force into its horizontal and vertical components,
- 4.c. Explore concept of moment.
- 4.d. Calculate moment.

5. Apply the three conditions of equilibrium.

Assessment Strategies

- 5.1. Written Product

Criteria

You will know you are successful when

- 5.1. you express the three conditions of equilibrium.
- 5.2. you determine beam reactions.
- 5.3. you calculate internal forces using a free body diagram.

Learning Objectives

- 5.a. Describe the three conditions of equilibrium.
- 5.b. Determine beam reactions.
- 5.c. Calculate internal forces using a free body diagram.

6. Determine properties of sections.

Assessment Strategies

- 6.1. Written Product

Criteria

You will know you are successful when

- 6.1. you determine centroid of a section.
- 6.2. you determine moment of inertia of a section.

Learning Objectives

- 6.a. Determine centroid of a section.
- 6.b. Determine moment of inertia of a section.

7. Analyze characteristics of columns.

Assessment Strategies

- 7.1. Project
- 7.2. Written Product

Criteria

You will know you are successful when

- 7.1. you explain column buckling.
- 7.2. you apply formulas to column selection.
- 7.3. you use tables to select columns.

Learning Objectives

- 7.a. Explore column buckling.
- 7.b. Apply formulas to column selection.
- 7.c. Use tables to select columns.

8. Analyze characteristics of horizontal spanning members.

Assessment Strategies

- 8.1. Project
- 8.2. Written Product

Criteria

You will know you are successful when

- 8.1. you analyze characteristics of tension spanning.
- 8.2. you analyze characteristics of compression spanning (arches and domes).
- 8.3. you analyze characteristics of trusses.
- 8.4. you analyze characteristics of beams.
- 8.5. you diagram beam shear and moment.

Learning Objectives

- 8.a. Analyze characteristics of tension spanning.
- 8.b. Analyze characteristics of compression spanning (arches and domes).
- 8.c. Analyze characteristics of trusses.
- 8.d. Analyze characteristics of beams.
- 8.e. Diagram beam shear and moment.

9. Explore lateral bracing systems.

Assessment Strategies

- 9.1. Project

Criteria

You will know you are successful when

- 9.1. you identify three categories of lateral bracing systems.
- 9.2. you explore characteristics of lateral bracing systems.

Learning Objectives

- 9.a. Identify three categories of lateral bracing systems.
- 9.b. Explore characteristics of lateral bracing systems.