South Central College

# CTLS 2110 Statics and Strengths of Materials

## Course Outcome Summary

### Course Information

**Description** This course covers an introduction to structural theory and calculation. It includes analysis of forces, vectors, calculations of forces, moments and internal stresses and strains in structural materials. It also includes tracing of load paths through the structure.

**Total Credits** 3

**Total Hours** 64

### Types of Instruction

| Instruction Type | Credits/Hours |
|---|---|
| Lecture | 2 |
| Lab | 1 |

### Pre/Corequisites

Math 125

### Institutional Core Competencies

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

### Course Competencies

**1. Explain the characterists of vectors**

**Learning Objectives**

Calculate vector component addition
Calculate vector's rectangular components
Perform graphical vector addition
Calculate bearing stress
Calculate shear stress
Calculate compression/tension stress

**2. Compute the moment of a force**

**Learning Objectives**

Calculate force's moment

Calculate multiple forces' moment
Calculate force and couple moment

### 3. Explain equilibrium equations

**Learning Objectives**

Explain force characteristics
Draw free body diagrams
Explain structural support end conditions
Calculate equilibrium problems
Analyze beam's end support conditions

### 4. Analyze cable structures

**Learning Objectives**

Explain cable geometry and characteristics
Calculate cable stress

### 5. Analyze trusses

**Learning Objectives**

Calculate truss section analysis
Calculate truss joint analysis
Calculate diagonal tension counter
Explain arch principles

### 6. Create structural load paths

**Learning Objectives**

Calculate load tributary area
Calculate roof load path
Calculate foundation load path
Calculate floor load path
Calculate wall load path

### 7. Explain stress/strain relationship

**Learning Objectives**

Explain deformation/strain relationship
Calculate material's strain
Calculate material's stress

### 8. Explain cross-sectional properties

**Learning Objectives**

Calculate shape's Radius of Gyration
Calculate composite shape's Moment of Inertia
Calculate shape's Centroid

### 9. Examine bending and shear in simple beams

**Learning Objectives**

Construct beam load diagram
Construct beam shear diagram
Construct beam moment diagram

### 10. Explain beam internal bending stress

**Learning Objectives**

Calculate beam internal shear stress
Explain beam internal shear stress
Calculate beam internal bending stress
Select adequate beam size

### 11. Construct a model bridge

**Learning Objectives**

Design a model truss bridge within the given parameters
Construct the bridge from the materials provided
Test the bridge using the stress tester
Summarize the results of the structural test

**SCC Accessibility Statement**

South Central College strives to make all learning experiences as accessible as possible. If you have a disability and need accommodations for access to this class, contact the Academic Support Center to request and discuss accommodations. North Mankato: Room B-132, (507) 389-7222; Faribault: Room A-116, (507) 332-7222.

Additional information and forms can be found at: www.southcentral.edu/disability

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