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

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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 characteristics 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
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and discuss accommodations. North Mankato: Room B-132, (507) 389-7222; Faribault: Room A-116, (507)
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