



South Central College

# ARCH 1404 Statics and Strengths of Materials

## Common Course Outline

### 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	2/32
Lab	1/32

### Pre/Corequisites

MATH 125 Trigonometry

ARCH 1301 Studio 3

### 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 Outcomes

#### 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 test stress tester
- Summarize the results of the structural test

### SCC Accessibility Statement

Disability Services provides accommodations and other supports to students with permanent and temporary disabilities that affect their SCC experience. Disabilities may include mental health (anxiety, depression, PTSD), ADHD, learning disabilities, chronic health conditions (migraine, fibromyalgia), sensory disabilities, and temporary disabilities (broken arm, surgery). Common accommodations are extended test time, private room for testing, audiobooks, and sign language interpreter.

Contact us: Faribault A116 (507) 332-5847. North Mankato E112 (507) 389-7222. [ds@southcentral.edu](mailto:ds@southcentral.edu)  
[www.southcentral.edu/disability](http://www.southcentral.edu/disability)

### Grading Scale

Each project, quiz, activity, and assignment will have an assigned possible number of points. Points will be awarded based on correctness of work. The total of all points earned will be divided by the maximum possible to determine a percentage. Late assignments will be accepted anytime until the semesters end **Any work handed in late (regardless of duration) will incur a 10% deduct from the grade for that instance.**

Grades will be based on the following percentage of points earned

A	92-100
A-	90-91.9
B+	87-89.9
B	83-86.9
B-	80-82.9
C+	77-79.9
C	73-76.9
C-	70-72.9

Note: Grades below 70% will not count towards degree completion, course must be repeated

D+	67-69.9
D	63-66.9
D-	60-62.9
F	Below 60

### Attendance Expectation

Class attendance / participation contributes significantly to academic success. Students who attend classes regularly tend to earn higher grades and have higher passing rates in courses. Excessive absences may jeopardize your grades or even your ability to continue in this course. **Class participation will be part of your grade! The following will apply in all ARCH program courses:**

- An absence is excused ONLY if the student contacts the instructor BEFORE class.
- If you are absent from class for any reason, you are responsible for all missed work and for contacting the instructor promptly.
- Unexcused absences for 3 consecutive class sessions will reduce your final grade by 10% after the first occurrence and automatic course failure after the second occurrence. Overall attendance falling below 50% will result in automatic course failure.
- Online attendance is available at the instructor's discretion. It is reserved for extenuating circumstances and is NOT a replacement for attendance.

