MOHAWK VALLEY COMMUNITY COLLEGE

UTICA & ROME, NEW YORK

COURSE OUTLINE

STRENGTH OF MATERIALS | CIVIL

CT 221

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**Course Outline:** **CT 221 – Strength of Materials: Civil**

1. **Catalog Description**

CT 221 Strength of Materials: Civil [C-2, P-4, CR-4]

This course introduces the fundamental concepts used to design structural members. Topics include the relationship between stress and strain, shear and moment diagrams, deflection of beams, and columns. Practicums include computational work related to problem analysis and the performance of tests on various construction materials such as steel and concrete.

Prerequisite: CT 121 Statics

1. **Materials**

Scientific calculator, engineering computation paper, 1” (minimum) 3-ring binder

1. **Course Objectives**

The purpose of this course is to familiarize students with the fundamentals of design concepts as well as a basic understanding of stress and strain. The course is a prerequisite to courses in structural design. Practicums introduce students to equipment and procedures used for testing common construction materials.

1. **Student Learning Outcomes** *(ETAC-ABET Assessment Criteria)*
2. Students will be able to discuss the topics of strength of materials and have an understanding of engineering properties of common construction materials.
3. Students will be able to perform various laboratory tests used on common construction materials. (3, 4)
4. Students will be able to calculate stress and strain for various materials. (1, 2)
5. Students will be able to calculate axial deformation. (1, 2)
6. Students will be able to calculate thermal deformation and thermal stress. (1, 2)
7. Students will be able to calculate and sketch shearing force and bending moment diagrams for beams under a variety of loading conditions. (1, 2)
8. Students will be able to perform calculations for centroid, moment of inertia, and radius of gyration for various shapes. (1, 2)
9. Students will be able to perform a tensile test of various metals. (3, 4)
10. Students will be able to solve problems relating to bending stress. (1)
11. Students will be able to solve problems using Mohr’s Circle. (1)
12. Students will be able to perform calculations for analysis of columns. (1, 2)
13. Students will be able to produce technical reports. (3, 4)
14. Students will be able to demonstrate the ability to use basic software (Word, Excel, PPT).
15. Students will be able to function effectively as a member of a team. (5)
16. **Major Topics**

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| **Week** | **Topic** |
| 1 | Introductions and fundamentals |
| 2 | Design properties/engineering properties of materials |
| 3 | Design of members under stress |
| 4 | Deformation, thermal stress |
| 5 | Shearing force and bending moment diagrams |
| 6 | Shearing force and bending moment diagrams |
| 7 | Centroids, moment of inertia, and radius of gyration |
| 8 | Centroids, moment of inertia, and radius of gyration |
| 9 | Stress due to bending |
| 10 | Stress due to bending |
| 11 | Shear stress in beams |
| 12 | Shear stress in beams, deflection of beams |
| 13 | THANKSGIVING BREAK - ENJOY YOUR TIME OFF!! |
| 14 | Columns |
| 15 | Combined stresses and Mohr’s Circle |