

**SAULT STE. MARIE, ON**  
**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**COURSE OUTLINE**

COURSE TITLE: STRENGTH OF MATERIALS

CODE NO.: MCH212 SEMESTER: III

PROGRAM: CIVIL ENGINEERING TECHNOLOGY

AUTHOR: D. .1. ELLIOTT

DATE: SEPT 1994 PREVIOUS OUTLINE DATED: AUG 1991

APPROVED:  / v UII&SMCL / ^-cJ 'J- /  
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**TOTAL CREDIT HOURS: 64**

**PREREQUISITE(S): MCH100**

**L PHILOSOPHY/GOALS:**

The goal of this course is to build on the basic knowledge that the student acquired in the introductory statics course. A review of statics will be followed by stress/strain relationships, connections, geometric properties of sections and stresses in simple beams.

**H. STUDENT PERFORMANCE OBJECTIVES (OUTCOMES):**

Upon successful completion of this course the student will:

- 1) Investigate and solve problems using free body diagrams and equations of equilibrium
- 2) Analyze trusses for member forces
- 3) Apply fundamental principles of stress/strain relationships to analyze and design simple engineering problems
- 4) Analyze and design bolted, and welded structural connections
- 5) Calculate centroid, moment of inertia and radius of gyration for simple geometric areas and composite areas
- 6) Calculate and draw shear force and bending moment diagrams for simple beams
- 7) Perform laboratory experiments that will enhance the students' basic understanding of stress/strain and load flexure relationship in beams.

**III. TOPICS TO BE COVERED:**

- 1) Brief Statics Review
- 2) Truss Analysis
- 3) Stress/Strain Relationships
- 4) Bolted, Welded Connections and Thin-walled Pressure Vessels
- 5) Centroid, Moment of Inertia and Radius of Gyration
- 6) Shear and Moments and Beams
- 7) Laboratory Experiments

**IV. LEARNING ACTIVITIES/REQUIRED RESOURCES**

1, Statics Review

Learning Activities: In class instruction and problem sets for the review of:  
- Forces and Units  
- Force Vectors  
- Free-Body Diagram

Resources: Chapters 1 to 3, and Appendix A

Truss Analysis

Learning Activities: In class instruction and problem sets for the review of:  
- Method of Joints  
- Method of Sections

Resources: Chapter 4

Stress/Strain Relationships

Learning Activities: In class instruction and problem sets on:  
- Axial and Shearing Stresses  
- Units, Ultimate Stress, Allowable Stress  
- Factor of Safety  
- Structural Shapes  
- Axial and Shearing Strain  
- Poisson's Ratio  
- Elastic Limit, Modulus of Elasticity  
- Stress-Strain Diagram  
- Axial Stresses in Members of Two Materials  
- Thermal Stresses

Resources: Chapter 7 and 8

Bolted, Welded Connections and Thin-walled Pressure Vessels

Learning Activities: In class instruction and problem sets on:  
- Types of Bolted Connections  
- Types of Failures in Bolted Connections  
- Stresses in Bolted Connections  
- Analysis and Design of Bolted Connections  
- Types of Welds  
- Strength of Welded Connections  
- Design of Welded Connections  
- Thin-walled Pressure Vessels

Resources: Chapter 9

5. Centroid and Moment of Inertia

Learning Activities In class instruction and problem sets on:  
- Centre of Gravity of an area  
- Centroid of Composite Areas  
- Moment of Inertia  
- Transfer Formula  
- Moment of Inertia of Composite Areas  
- Radius of Gyration

Resources Chapter 10

Stresses in Simple Beams

Learning Activities In class instruction and problem sets on:  
- Types of Beams and Loadings  
- End Supports  
- Shear-Force Diagram  
- Bending Moment Diagram  
- Relationship Between Beam Loading, Shear and Moment Diagrams  
- Moving Loads  
- Flexure Formula

Resources Chapters 11 and 12

7. Laboratory Experiments

Learning Activities Physical experiments on stress/strain and bending

Resources Civil Testing Lab  
Chapters 8,11 **and** 12

**EVALUATION METHODS:** (INCLUDES ASSIGNMENTS, ATTENDANCE REQUIREMENTS, ETC.)

A final grade will be derived as follows:

Assignments	15%
Two Term Tests at 25%	50%
Final Test	35%
Total	100%

**STRENGTH OF MATERIALS**  
COURSE NAME

MCH212  
COURSE CODE

The grading system used will be as Follows:

A+	90% - 100%
A	80% - 89%
B	70% - 79%
C	55% - 69%
R	Repeat

- 1) Minimum acceptable grade for this course is 55%.
- 2) If at the end of the semester the overall mark is below 55%, then it will be up to the instructor whether or not a rewrite test will be granted. The criteria employed for arriving at that decision is class attendance, class participation and overall grade, which should be at least 45%.
- 3) In the case a rewrite is granted, it will be permitted only once, it will cover the entire course outline and will limit the maximum obtainable grade for the course to 60%.

**VI. REQUIRED STUDENT RESOURCES**

Required Text                      Statics and Strength of Materials  
Fourth Edition  
Bassin/Brodsky/Wolkoff, McGraw Hill

**VII. ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE COLLEGE LIBRARY:**

Book Section                      Applied Strength of Materials  
Latest Edition  
Jensen/Chenoweth, McGraw Hill

**Vffl. SPECIAL NOTES**

Students with special needs (eg. physical limitations, visual impairments, hearing impairments, learning disabilities) are encouraged to discuss required accommodations confidentially with the instructor.

Your instructor reserves the right to modify the course as he/she deems necessary to meet the needs of students.