

C12

ARC 219
CODE NO.

Structural Engineering
COURSE NAME

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY
SAULT STE. MARIE, ONTARIO

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COURSE OUTLINE

COURSE TITLE: Structural Engineering

CODE NO.: ARC 219

PROGRAM: Civil Engineering Technology

SEMESTER: IV

AUTHOR: S. Ienco

DATE: January 1993 *Mu.*

NEW: _____ REVISION: X

APPROVED: *[Signature]*
CHAIRPERSON

93-01-07
DATE

Structural Engineering

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Total Credit Hours 64

Prerequisite (s) MCH 212

I. PHILOSOPHY/GOALS:

The student will acquire a basic knowledge in the design of structural steel elements such as simple beams, columns, tensile members, walls, floor systems, base plates and connections. The interaction of these various components will be emphasized by investigating the design of a one-storey structural steel building.

In addition, the student will be introduced to computer software to analyze and design beams and columns.

II. STUDENT PERFORMANCE OBJECTIVES:

Upon successful completion of this course the student will:

1. Design structural steel elements such as beams, columns, floor and wall systems.
2. Demonstrate a knowledge of the principles of Limit States design versus working stress design.
3. State, define and determine dead and live loadings for structures using the appropriate building codes.
4. Analyze/design both welded and bolted connections.
5. Design a simple one story steel structure, including beams, columns and connections.

III. TOPICS TO BE COVERED

1. Review of Shear and Moment Diagrams For Beams.
2. Review of Flexural and Shear Stresses in Beams.
3. Deflection of Beams
4. Limit States and Working Stress Design of Beams.
5. Analysis and Design of Columns.

Structural Engineering

ARC 219

COURSE NAME

CODE NO.

III. TOPICS TO BE COVERED (continued)

6. Building Code References.
7. Design of Welded and Bolted Connections.

IV. TOPICS DESCRIPTION

TOPIC NO.

TOPIC DESCRIPTION

1.

Beams and Connections

- review of shear and moment diagrams
- review of flexural and shear formula
- dead load and live load on structures
- deflection theory
- use of standard beam deflection tables
- beam failure modes
- design of laterally supported and laterally unsupported beams
- use of beam selection tables
- design of steel beam bearing plates
- use of standard double angle beam connections tables
- use of beam and girder computer program

2.

Columns

- types of column cross sections
- slenderness ratio
- buckling loads on columns
- Euler's formula
- effect of column end restraints
- design formulas for columns
- design of stocky, intermediate and long columns
- use of factored axial compressive resistance of columns tables
- design of steel base plates
- use of column selection computer program

Structural Engineering

ARC 219

COURSE NAME

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TOPIC NO.

TOPIC DESCRIPTION

3.

Combined Axial and Bending Stresses

- columns with bending
- beams with axial loads
- eccentrically loaded members

4.

Single Storey Building Design

- general design considerations
- building code requirements
- design of roof structure
- design of both interior and exterior columns
- design of column base plate
- design of lateral bracing

V. REQUIRED STUDENTS RESOURCES (including textbooks and workbooks)

APPLIED STRENGTH OF MATERIALS

Latest Edition
Jensen/Chenoweth
McGraw Hill

HANDBOOK OF STEEL CONSTRUCTION

Canadian Institute of Steel Construction

VI. METHOD OF EVALUATION

A final grade will be derived from the results of laboratories, quizzes and three tests weighed as follows:

Assignments	20%
Two term tests each worth 25%	50%
Final test	30%
TOTAL	<hr/> 100%

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 60%.
- 2) Homework problems are assigned during lecture, inspected by the instructor during subsequent lecture, followed by a discussion and solution to selected problems.
- 3) If at the end of the semester your overall average of the combined assignments and three tests is below 60%, then it will be up to the instructor whether you receive an "R" repeat or an "X" rewrite. The criteria employed for arriving at that decision is class attendance, class participation and overall grade, which should be a least 50%.
- 4) In case a rewrite is granted, it will be permitted only once, it will cover the entire course outline, and it will limit the maximum obtainable grade for the course to 60%.

VII. SPECIAL NOTES

Students with special needs (e.g. physical limitations, visual 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 the students.

