SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title:	STRENGTH OF MATERIALS
Code No.:	MCH 232
Program:	MECHANICAL DRAFTING TECHNICIAN
Semester:	THREE
Date:	JULY 1983
Author:	COLIN RISING

New; Revision

APPROVED: ^0

Chairperson ;\ Date

STRENGTH OF MATERIALS	MCH 232
Course Name	Course Number

PHILOSOPHY/GOALS:

To have the student able to design beams, shafts and simple structures with respect to standard practices. Such abilities are essential for a place with the workforce in the field of engineering.

METHOD OF ASSESSMENT {GRADING METHOD):

A
B
C
I

Grading will be on logical solutions, layout, sketches or diagrams, and general tidiness of presentation.

TEXTBOOK(S):

Mechanics of Materials, Levinson

MECHANICAL TECHNICIAN

Strength of Materials (MCH 232-4)

REFERENCES:

Mechanics of Materials - Lawson and Cox

Strength of Materials - Fitzgerald

Mechanics of Materials - Angus and Palmer

COURSE STUDY OUTLINE

STRENGTH OF MATERIALS (MCH 232-4)

Topic Mo.	Periods	Topic Information
1	4	Review of conditions of equilibrium
2	6	Review of methods of sections
3	12	Torsion
4	8	Shear force and bending moment diagrams
5	8	Bending stresses in beams

STRENGTH OF MATERIALS (MCH 232-4)

Course Textbook - Mechanics of Materials (Levinson)

UNIT #1 REVIEW OF METHOD OF SECTIONS AND EQUILIBRIUM

General Objective:

The student will recall Unit #4 and Unit #5 of Applied Mechanics MCH 110.

Specific Objective:

1. To be able to recall the three equations of equilibrium.
2. To be able to apply the three equations of equilibrium.
3. To be able to calculate the internal force in a member of a structure using the Method of Sections.

UNIT #2 TORSION

General Objective:

The student will be able to design shafts and torsion bars on the basis of shear stress and angle of twist.

Specific Objective:

1. To be able to define the term shear stress.
2. To be able to define the term shear strain.
3. To be able to define the term polar moment of inertia.
4. To be able to calculate the polar moment of inertia for a solid circular shaft.
5. To be able to calculate the polar moment of inertia for a hollow circular shaft.
6. To be able to convert degrees to radian measure.
7. To be able to recall the number of foot lb./sec. in one horsepower.
8. To be able to convert units of force, units of torque, units of stress, units of time and units of polar moments of inertia.
9. To be able to apply the formula using the proper units.

10. To be able to calculate the maximum shear stress.
11. To be able to calculate the maximum angle of twist.
12. To be able to construct a Twisting Moment Diagram.
13. To be able to define the term speed reducer.
14. To be able to utilize the relationship between speed and torque.
15. To be able to define the term spring constant.
16. To be able to calculate the spring constant for a solid shaft.
17. To be able to calculate the spring constant for a hollow shaft.
18. To be able to define the term series combination.
19. To be able to define the term parallel combination.
20. To be able to calculate the equivalent spring constant in a series combination.
21. To be able to calculate the equivalent spring constant in a parallel combination.
22. To be able to produce a free-body diagram for the forces on the bolts of a coupling subjected to a torque.
23. To be able to calculate the shearing stresses in the bolts of a coupling subjected to torque.
24. The student will solve correctly the following problems: 2-2, 3, 4, 5, 6, 8, 9, 10, 13, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 44, 45, and 47.

UNIT #3 SHEAR FORCE AND BENDING MOMENT IN BEAMS

General Objective:

The student will be able to determine the shearing force and the bending moment in any part of a statically determinate beam.

Specific Objective:

1. To be able to define the term beam..
2. To be able to define the term statically determinate.

3. To be able to define the term shear force.

4. To be able to define the term bending moment.

5. To be able to define the term simple beam.

6. To be able to define the term cantilever beam.

7. To be able to define the term overhanging beam.

8. To be able to define the term concentrated load.

9. To be able to define the term uniformly distributed load.

10. To be able to define the term pure moment or couple.

11. To be able to recall the three equations of equilibrium.

12. To be able to state the convention for positive shear.

13. To be able to state the convention for negative shear.

14. To be able to state the convention for positive bending.

15. To be able to state the convention for negative bending.

16. To be able to state the relationship between the shear force diagram and the bending moment diagram.

17. a) To be able to ascertain the point or points of maximum shear in the shear force diagram,
    b) To be able to ascertain the point or points of zero shear in the shear force diagram.

18. a) To be able to ascertain the point or points of maximum bending moment in the bending moment diagram,
    b) To be able to ascertain the point or points of zero bending moment diagram.

19. To be able to construct the shear force diagram for a given loading on a beam.

20. To be able to construct a composite bending moment diagram for a given loading on a beam.

21. To be able to construct a composite bending moment diagram by the method of superposition.

22. a) To be able to recall the areas of a rectangle, triangle, and parabola,
    b) To be able to recall the position of the centroids of a rectangle, triangle, and parabola.

23. The student will be able, using the above specific objectives, to correctly solve the following problems: 4-4, 6, 7, 9, 11, 17, 18, 20, 24, 26, 27, and 28.

UNIT #4 BENDING STRESSES IN BEAMS

General Objectives;

The student will be able to calculate the tensile and compressive stresses induced in the beam due to bending and thereby allowing the student to properly design the beam.

Specific Objective:

1. To be able to construct a shear force diagram.

2. To be able to construct a bending moment diagram.

3. To be able to ascertain the points of maximum and zero bending in a bending moment diagram.

4. To be able to recall the method for calculation of the moment of inertia of a composite section.

5. To be able to calculate accurately, the moment of inertia of a composite section.

6. To be able to state the formula - $\frac{M}{T} = \frac{J}{Y}$

7. To be able to state the formula - $\frac{M}{T} = \frac{J}{T}$ correctly using the proper units.

8. To be able to solve correctly, using the above specific objectives, the following problems: 5-5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 19, 20, 22, and 23.