

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



Sault College

COURSE OUTLINE

COURSE TITLE: STATICS & MECHANICS OF MATERIALS
CODE NO. : MCH 220 **SEMESTER:** 3
PROGRAM: CIVIL/CONSTRUCTION
AUTHOR: KARL UCHMANOWICZ
DATE: SEPT. **PREVIOUS OUTLINE DATED:**
2000
APPROVED: _____
DEAN **DATE**
TOTAL CREDITS: 4
PREREQUISITE(S): PHY 118
HOURS/WEEK: 5

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School of Technology, Engineering & Technical Trades
(705) 759-2554, Ext. 485

I. COURSE DESCRIPTION:

The objective of this course is to introduce the student to the principles and methods used for finding forces and loads in structures, and subsequently use accepted principles and methods to find how construction materials react to these forces and loads.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

1. Confidently use engineering units.

Potential Elements of the Performance:

- Solve selected unit problems and conversions.

2. Understand force vectors.

Potential Elements of the Performance:

- Use trig and algebra to solve force vectors
- Use graphical methods to solve force vectors
- Resolve vectors into components
- Solve vectors with "methods of components"

3. Understand "Moments" of forces.

Potential Elements of the Performance:

- Analyze and solve problems having "moment" forces

4. Apply "Three Conditions of Equilibrium" to determine unknown forces and reactions.

Potential Elements of the Performance:

- Apply "Newtons" Laws to forces in structures
- Construct "free Body Diagrams" (FBD)
- Apply "Three Conditions of Equilibrium" to FBD's
- Determine compression, tensile and shear forces

5. Apply "Methods of Joints" and "Sections" to solve for internal forces in structures.

Potential Elements of the Performance:

- Distinguish between "trusses" and "frames"
- Recognize tension and compression forces in members
- Analyze "joints and supports" on frames and trusses

6. Apply "Friction Laws" to structures.

Potential Elements of the Performance:

- Use Friction Laws to determine forces, to determine tipping or sliding of members

7. Gain knowledge and understanding relating to mechanical properties of construction materials.

Potential Elements of the Performance:

- Understand: simple stress, ductility, toughness, strengths, elasticity, hardness, brittleness
- Solve problems using stress-strain relationships
- Analyze and compare axial stress, shear stress and thermal stress on members, frames and joints
- Solve problems using Poisson' Ratio, modulus of elasticity, factors of safety

8. Gain the skill to finding centroids and moments of inertia.

Potential Elements of the Performance:

- Solve problems to find centre of gravity of members
- Problems to establish centroids of areas
- Use charts to solve for "Moment of Inertia" of various construction shapes
- Understand principles of "Moments of Inertia" as required to find bending stresses

9. Determining stress in simple beams.

Potential Elements of the Performance:

- Recognize beam loading and supports
- Calculate and draw shear force diagrams
- Calculate and draw bending movement diagrams
- Calculate and locate horizontal shear stress
- Solve for bending stresses using flexure formula

III. TOPICS:

1. Introduction - units
- conversions
2. Vector Analysis
3. Moments of Force
4. Conditions of Equilibrium
5. Frame and Truss Analysis
6. Friction
7. Mechanical Properties of Materials
8. Centroids and Moments of Inertia
9. Simple Beams

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

"Elementary Structures for Architects and Builders" - 3rd ed.

V. EVALUATION PROCESS/GRADING SYSTEM:

Term Tests	65%
Final Test	25%
Labs or Assignments	10%

- Test -- three term tests
-- one week notice
- Labs -- as equipment and time permits
-- mandatory

Note: No re-writes will be allowed

The following semester grades will be assigned to students in post secondary courses:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 - 100%	4.00
A	80 - 89%	3.75
B	70 - 79%	3.00
C	60 - 69%	2.00
R (Repeat)	59% or below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	

S	Satisfactory achievement in field placement or non-graded subject areas.
U	Unsatisfactory achievement in field placement or non-graded subject areas.
X	A temporary grade. This is used in limited situations with extenuating circumstances giving a student additional time to complete the requirements for a course (see <i>Policies & Procedures Manual – Deferred Grades and Make-up</i>).
NR	Grade not reported to Registrar's office. This is used to facilitate transcript preparation when, for extenuating circumstances, it has not been possible for the faculty member to report grades.

VI. SPECIAL NOTES:

Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your instructor and/or the Special Needs office. Visit Room E1204 or call Extension 493, 717, or 491 so that support services can be arranged for you.

Retention of course outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Rights and Responsibilities*. Students who engage in “academic dishonesty” will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course outline amendments:

The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

VIII. DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.