SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

Sault College

COURSE OUTLINE

COURSE TITLE:	STRENGTH OF MATERIALS		
CODE NO. :	MCH103	**SEMESTER:**	4
PROGRAM:	Mechanical Technician		
AUTHOR:	R. ACKERT		
DATE:	JAN/09	**PREVIOUS OUTLINE DATED:**	DEC/07

APPROVED:

"Corey Meunier"
CHAIR

_____
DATE

TOTAL CREDITS:	THREE
PREREQUISITE(S):	APPLIED MECHANICS – STATICS – MCH110
HOURS/WEEK:	THREE

I. COURSE DESCRIPTION:

The general objective of this course is to give students destined for the mechanical trades a basic understanding how materials respond to applied forces. The prerequisite course on Applied Mechanics – Static deals with the interaction of forces assuming solid bodies are undeformable. This course extends that knowledge to study how solid bodies deform under load, how to calculate the amount of deformation and how to keep deformation within acceptable limits.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. Introduction to Statics and Equilibrium Reactions

Potential Elements of the Performance:

- Define the terms mass, weight, force, pressure, energy and work.
- Carry out units analysis in equations.
- State Newtons' three laws and explain their significance to the design of structures.
- Determine how loads applied to structures are distributed to supporting members.
- Construct free-body diagrams for particles and rigid bodies.

2. Reactions of Materials Under Load - Stress, Strain, And Deformation

Potential Elements of the Performance:

- Identify and define the various elements of a stress/strain diagram (elastic range, plastic range, proportional limit, elastic limit, yield point, ultimate strength, rupture strength, elongation).
- Define and explain the difference between ductile and brittle materials.
- Explain the concept of toughness for statically and dynamically loaded materials.
- Explain the relationship between safety factor and allowable or working stress.
- Differentiate tensile, compressive and shear stresses and to know which one to use in particular cases.
- Explain Hooke's law and Young's modulus, how they relate and their importance to structures.
- To explain the concept of stress concentration and when it should be taken into consideration.
- Calculate allowance for thermal effects in structures.

3. Centroids and Cross-Sectional Properties of Structural Members

Potential Elements of the Performance:

- Explain the difference between centroid and center of gravity.
- Calculate the center of gravity for masses with compound shapes.
- Explain the concept of moment of inertia and to calculate the moment of inertia for compound members.
- Define the term radius of gyration.
- Calculate a column's resistance to buckling under axial load.

4. Shear and Bending Moments in Beams

Potential Elements of the Performance:

- Construct load, shear and moment diagrams for beams with various support and loading configurations.
- Determine the maximum shear and moment locations for beams with various support and loading configurations.

5. Bending and Shear Stresses In Beams

Potential Elements of the Performance:

- Calculate the bending stresses, shear stresses and deflection in beams with various cross-sectional shapes and various support and loading configurations.
- Describe methods to resist lateral buckling in beams.

6. Column Analysis and Design

Potential Elements of the Performance:

- Describe the various parameters that have to be evaluated to prevent failure in columns under axial and eccentric loading.
- Describe methods to prevent buckling in columns.
- To calculate the load carrying ability of columns with various shapes, support and loading configurations.

III. TOPICS:

1. Introduction to Statics and Equilibrium Reactions
2. Reactions of Materials Under Load - Stress, Strain, And Deformation
3. Centroids and Cross-Sectional Properties of Structural Members
4. Shear and Bending Moments in Beams
5. Bending and Shear Stresses In Beams
6. Column Analysis and Design

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Onouye, Barry, Static and Strength of Materials, Foundation for Structural Design – 1st ed, Pearson Prentice Hall, ISBN 0-13-111837-4

V. EVALUATION PROCESS/GRADING SYSTEM:

Class participation – 20%
Assignments – 30%
Test #1 - 25%
Test #2 – 25%

The following semester grades will be assigned to students:

Grade	Definition	*Grade Point Equivalent*
A+	90 – 100%	4.00
A	80 – 89%	
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00

CR (Credit)	Credit for diploma requirements has been awarded.
S	Satisfactory achievement in field /clinical placement or non-graded subject area.
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR	Grade not reported to Registrar's office.
W	Student has withdrawn from the course without academic penalty.

VI. SPECIAL NOTES:

Disability Services:
If you are a student with a disability (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Disability Services office. Visit Room E1101 or call Extension 2703 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.

Communication:
The College considers ***WebCT/LMS*** as the primary channel of communication for each course. Regularly checking this software platform is critical as it will keep you directly connected with faculty and current course information. Success in this course may be directly related to your willingness to take advantage of the ***Learning Management System*** communication tool.

Plagiarism:
Students should refer to the definition of "academic dishonesty" in *Student Code of Conduct*. 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 advance credit transfer (advanced standing) should obtain an Application for Advance Credit from the program coordinator (or the course coordinator regarding a general education transfer request) or academic assistant. Students will be required to provide an unofficial transcript and course outline related to the course in question.

Credit for prior learning will also be given upon successful completion of a challenge exam or portfolio.