

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



COURSE OUTLINE

COURSE TITLE: APPLIED MECHANICS - STATICS

CODE NO. : MCH100 **SEMESTER:** TWO

PROGRAM: CIVIL

AUTHOR: SAL IENCO

DATE: JANUARY 2013 **PREVIOUS OUTLINE DATED:** JANUARY 2012

APPROVED: *"Corey Meunier"* _____
CHAIR DATE

TOTAL CREDITS: FOUR

PREREQUISITE(S):

HOURS/WEEK: FOUR

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I. COURSE DESCRIPTION:

You are surrounded by a wide variety of structures such as buildings, bridges, and dams. These structures play such an important role in our lives that we cannot ignore them. As a technician, you will need to know this subject well enough to intelligently facilitate communication between designers and construction personnel.

This Applied Mechanics course explores mathematical expressions which have been developed to describe how various elements of structures work. But at the same time every effort is made to link the mathematical expression to structural function. To that end you are encouraged to visually appreciate various structures in your community while understanding the mathematical relationships found in structures.

This course is the first in the series of courses that leads to MCH212 and ends with CIV225.

II. LEARNING OUTCOME:

1. Demonstrate relevant mathematical, computer and technical problem solving skills as it relates to civil engineering / construction projects.

III. TOPIC OUTLINE

Outcome	Topic and Content	Reading	Week
1	1. Force Systems 1.1. Introduction – relationship of Statics to Structures 1.2. Real Life Examples of Statics 1.3. Newton's Laws 1.4. Characteristics of a force 1.5. Resultant of a System of Forces 1.6. Equilibrant of a System of Forces 1.7. Principles of Transmissibility 1.8. Types of Force Systems 1.9. Free Body Diagram 1.10. Vector Addition 1.11. Vector Addition – Graphical 1.12. Graphical Addition of Three or More Vectors 1.13. Vector Addition – Analytical Method 1.14. Components of a force 1.15. Component Method of Vector Addition 1.16. Excel Spreadsheet – Resolving Forces 1.17. AutoCAD - Graphical Addition of Three or More Forces 1.18. Laboratory #1 - Force Table 1.19. Summarize Force System Topic 1.20. Applied Learning Activity 1.21. Assignment #1/Quiz	Chapter 1,2 LMS Handout	1-3

1	2. Moments and Couples 2.1. Real Life Examples of Moments 2.2. Moment of a Force 2.3. Principles of Moments – Varignon’s Theorem 2.4. Resolution of a Force into a Force and Couple Acting at Another Point 2.5. Free Body Diagram 2.6. Resultant of Two Parallel Forces 2.7. Summarize Moments and Couples Topic 2.8. Applied Learning Activity 2.9. Assignment #2/Quiz	Chapter 2 LMS Handout	4-5
1	3. Equilibrium of Two-Dimensional Systems 3.1. Real Life Examples of Equilibrium of Two-Dimensional Systems 3.2. Externally Applied Loads and Internal Reactions 3.3. Collinear Force System 3.4. Concurrent Force System – Equilibrium of a Particle 3.5. Free-Body Diagram of Particles 3.6. Support Conditions for Coplanar Structures 3.7. Typical Connections and Support Examples 3.8. Static Equilibrium involving Point Loads 3.9. Summarize Equilibrium of Two-Dimensional Systems Topic 3.10. Applied Learning Activity 3.11. Laboratory 2 – Mobile Construction	Chapter 3 LMS Handout	6
1	4. Review/Mid Term Test 4.1. Review for Mid Term Test 4.2. Mid Term Test		7
1	5. Equilibrium of Two-Dimensional Systems 5.1. Free-Body Diagram of Rigid Bodies 5.2. Static Equilibrium Involving Distributed Loads 5.3. Equilibrium Involving Pulleys 5.4. Summarize Equilibrium of Two-Dimensional Systems Topic 5.5. Applied Learning Activity 5.6. Laboratory 2 – Mobile Construction 5.7. Assignment #3/Quiz	Chapter 3 LMS Handout	8
1	6. Analysis of Selected Determinate Structural Systems 6.1. Real Life Examples of Structural Systems 6.2. Planar Trusses 6.3. Free Body Diagram 6.4. Method of Joints 6.5. Quick Method of Joints	Chapter 4 LMS Handout	8

- 6.6. Diagonal Tension Counters
- 6.7. Maxwell's Diagram – Graphical Truss Analysis
- 6.8. Zero-force Members
- 6.9. Pinned Frames With Multiple-Force Members
- 6.10. Flexible Cables With Concentrated Loads
- 6.11. Retaining Walls
- 6.12. Applied Learning Activity
- 6.13. Assignment # 4,5/Quizzes

13-14

1

7. The Laws of FrictionLMS
Handout

- 7.1. Real Life Examples of Friction
- 7.2. Characteristics of Friction Force
- 7.3. Graph of Friction Force Versus Applied Force
- 7.4. Static Region and Kinetic Region of Friction Force Vs. Applied Force Graph
- 7.5. Coefficient of Friction
- 7.6. Equation for Coefficient of Static Friction
- 7.7. Equation for Coefficient of Kinetic Friction
- 7.8. Problems to Determine Whether Motion is Impending or Not
- 7.9. Problems to Determine Whether Tipping or Sliding Will Occur
- 7.10. Laboratory #3

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8. Review/Looking Forward/Final Test

15

- Review
- Looking Forward to MCH212 – Strength of Materials Course – Third Semester
- Final Test

IV.**REQUIRED
RESOURCES/TEXTS/MATERIALS:****Statics and Strength of Materials***Foundations for Structural Design*

By Barry Onouye

V. EVALUATION PROCESS/GRADING SYSTEM:

You will be assigned a final grade based on successful completion of laboratories, assignments and tests, weighted as follows:

Laboratories/Assignments/Quizzes	40%
Mid Term Test	30%
Final Test	<u>30%</u>
TOTAL	100%

Each laboratory/assignment/quiz carries equal weight. Late submittals receive only a maximum grade of 60%. However, laboratories or assignments handed in later than one week will receive a grade of 0%.

An average of 50% on laboratories/assignments and 50% on tests is required for successful completion of this course.

The following semester grades will be assigned::

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 - 100%	4.00
A	80 - 89%	4.00
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.	

Assignments and Examination Policy:

If a student is unable to write a test or exam at the scheduled time the following procedure shall apply:

- The student shall provide the professor with advance notice (in writing) of the need to miss the test
- The student shall provide documentation as to the reason for the absence and the make-up will be at the discretion of the professor.
- Upon return the student is responsible to make arrangements for the writing of the test. This arrangement shall be made prior to the next schedule class.
- In the event of an emergency, the student shall telephone the professor as soon as possible at 759-2554, to notify of the absence. If the professor is not available, the college has a 24 hour voice mail system.
- In the event of a test missed due to emergency, the student shall provide documentation from a professional such as doctor or lawyer.

All late assignments (without documentation) will receive a maximum grade of C (60%).

VI. SPECIAL NOTES:Attendance:

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session.

It is the departmental policy that once the classroom door has been closed, the learning process has begun. Late arrivers will not be granted admission to the room.

VII. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located on the portal form part of this course outline.