

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



Sault College

**COURSE OUTLINE**

**COURSE TITLE:** MECHANICS OF MATERIALS  
**CODE NO. :** MCH212 **SEMESTER:** 3  
**PROGRAM:** CIVIL  
**AUTHOR:** SAL IENCO/DEAN MATTHEWS  
**DATE:** MAY 09 **PREVIOUS OUTLINE DATED:** JUN 08  
**APPROVED:**  

*“Corey Meunier”*  
CHAIR

\_\_\_\_\_  
DATE

**TOTAL CREDITS:** 4  
**PREREQUISITE(S):** MCH 100  
**HOURS/WEEK:** 4

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*School of The Natural Environment, Technology & Skilled Trades*  
*(705) 759-2554, Ext.2610*

**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 Mechanics of Materials 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 a continuation of MCH100 and leads to CIV225.

**II. LEARNING OUTCOME:**

1. Demonstrate relevant mathematical, computer and technical problem solving skills as it relates to civil engineering / construction projects.
2. Demonstrate an understanding of the working roles and inter-relationships required to adhere to the objectives of the project and work in accordance to labour-management principles and practices

**III. REQUIRED RESOURCES/TEXTS/MATERIALS:**

**Statics and Strength of Materials** Foundations for Structural Design  
Barry Onouye

**Interactive Structures – Visualizing Structural Behaviour**  
Shahin Vassigh

**IV. 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>
<b>TOTAL</b>	<b>100%</b>

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.	

## V. SPECIAL NOTES:

### 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. Please refer to the Student Academic Calendar of Events for the deadline date by which application must be made for advance standing.

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

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

### 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.

### 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*. A professor/instructor may assign a sanction as defined below, or make recommendations to the Academic Chair for disposition of the matter. The professor/instructor may (i) issue a verbal reprimand, (ii) make an assignment of a lower grade with explanation, (iii) require additional academic assignments and issue a lower grade upon completion to the maximum grade “C”, (iv) make an automatic assignment of a failing grade, (v) recommend to the Chair dismissal from the course with the assignment of a failing grade. 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.

Student Portal:

The Sault College portal allows you to view all your student information in one place. **mysaultcollege** gives you personalized access to online resources seven days a week from your home or school computer. Single log-in access allows you to see your personal and financial information, timetable, grades, records of achievement, unofficial transcript, and outstanding obligations, in addition to announcements, news, academic calendar of events, class cancellations, your learning management system (LMS), and much more. Go to <https://my.saultcollege.ca>.

Electronic Devices in the Classroom:

Students who wish to use electronic devices in the classroom will seek permission of the faculty member before proceeding to record instruction. With the exception of issues related to accommodations of disability, the decision to approve or refuse the request is the responsibility of the faculty member. Recorded classroom instruction will be used only for personal use and will not be used for any other purpose. Recorded classroom instruction will be destroyed at the end of the course. To ensure this, the student is required to return all copies of recorded material to the faculty member by the last day of class in the semester. Where the use of an electronic device has been approved, the student agrees that materials recorded are for his/her use only, are not for distribution, and are the sole property of the College.

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. Late arrivers may not be granted admission to the room.

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.

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.

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. TOPIC OUTLINE**

<b>Outcome</b>	<b>Topic and Content</b>	<b>Reading</b>	<b>Week</b>
1,2	<b>1. Stress</b> 1.1. Real Life Examples of Stress Applications 1.2. Definition of Stress 1.3. Building Big (PBS) Force Lab 1.4. Simple Stress Formula 1.5. Axial Stress 1.6. Bearing Stress 1.7. Shear Stress 1.8. Free Body Diagram 1.9. Summarize Stress Topic 1.10. Applied Learning Activity 1.11. Assignment #1	Chapter 6 LMS Handout	1
1,2	<b>2. Strain</b> 2.1. Real Life Examples of Strain Applications 2.2. Definition of Strain 2.3. Internet Resources 2.4. Strain Formula 2.5. Elastic Deformation in Tension and Compression Members 2.6. Free Body Diagram 2.7. Summarize Strain Topic 2.8. Applied Learning Activity 2.9. Quiz #1	Chapter 6 LMS Handout	2

1,2	<b>3. Stress and Strain</b> 3.1. Real Life Examples of Stress Strain Relationships 3.2. Hooke's Law 3.3. Modulus of Elasticity 3.4. Spring Constant Practical Investigation 3.5. Tensile test theory and application 3.6. Free Body Diagram 3.7. Summarize Stress Strain Topic 3.8. Applied Learning Activity 3.9. Laboratory 1 – Tensile Test	Chapter 6 LMS Handout	3,4
1,2	<b>4. Thermal Stress</b> 4.1. Real Life Examples of Thermal Stress 4.2. Deformation Due to Temperature Changes 4.3. Thermal stress theory 4.4. Free Body Diagram 4.5. Applied Learning Activity 4.6. Assignment # 2	Chapter 6 LMS Handout	5
1,2	<b>5. Torsion/ Factor of Safety</b> 5.1. Real Life Examples of Torsion 5.2. Implication of Torsion on Structural Components 5.3. Torsional Stresses 5.4. Factors of Safety in Design 5.5. Applied Learning Activity 5.6. Quiz #2	Chapter 6 LMS Handout	6
	<b>6. Mid-term Test</b>		7
1,2	<b>7. Centroids</b> 7.1. Real Life Examples of Centroids 7.2. Practical Demonstration For Determining Centroids 7.3. Centroids – Simple Shapes 7.4. Centroids of Complex Shapes 7.5. Manual Calculations of Centroids 7.6. Using AutoCAD to Determine Centroids 7.7. Applied Learning Activity 7.8. Quiz #3	Chapter 7 LMS Handout	8
1,2	<b>8. Moment of Inertia</b> 8.1. Real Line Examples of Moment of Inertia 8.2. Moment of Inertia of an Area 8.3. Manual Calculations of Moment of Inertia 8.4. Using AutoCAD to Determine Moment of Inertia 8.5. Applied Learning Activity 8.6. Assignment #3	Chapter 7 LMS Handout	9
1,2	<b>9. Shear Forces and Bending Moments in Simple Beams With Point Loads</b> 9.1. Real life Examples of Simple Beams With Point Loads	Chapter 8 LMS Handout	10

	9.2. Beam Loading, Supports and Beam Types		
	9.3. Free Body Diagram of Beam		
	9.4. Mathematical Analysis of Beam		
	9.5. Shear and Bending Moment for Concentrated loads		
	9.6. Semi-Graphical Method for Drawing Shear and Moment Diagrams		
	9.7. Applied Learning Activity		
	9.8. Quiz #4		
1,2	<b>10. Shear Forces and Bending Moments in Simple Beams With Distributed Loads</b>	Chapter 8 LMS Handout	11
	10.1. Real Life Examples of Beams With Distributed Loads		
	10.2. Free Body Diagram of Beam		
	10.3. Mathematical Analysis of Beam		
	10.4. Shear and Bending Moment Diagrams for Distributed Loads		
	10.5. Semi-Graphical Method for Drawing Shear and Moment Diagrams		
	10.6. Applied Learning Activity		
	10.7. Assignment # 4		
1,2	<b>11. Shear Forces and Bending Moments in Simple Beams With Combination Loads</b>	Chapter 8 LMS Handout	12
	11.1. Real Life Examples of Beams With Combination Loads		
	11.2. Free Body Diagram of Beam		
	11.3. Mathematical Analysis of Beam		
	11.4. Shear and Bending Moment Diagrams for Combined Loads		
	11.5. Semi-Graphical Method for Drawing Shear and Bending Moment Diagrams		
	11.6. Applied Learning Activity		
	11.7. Assignment #5		
1,2	<b>12. Shear Forces and Bending Moments in Overhanging Beams</b>	Chapter 8 LMS Handout	13
	• Real Life Examples of Overhanging Beams		
	• Free Body Diagram of Beam		
	• Mathematical Analysis of Beam		
	• Shear and Bending Moment Diagrams		
	• Semi-Graphical Analysis for Drawing Shear and Bending Moment		
	• Applied Learning Activity		
	<b>13. Review/Looking Forward/Final Test</b>		14-15
	• Review		
	• Tie in Between MCH212 and Structures Course		