

**SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY  
SAULT STE MARIE, ON**



**COURSE OUTLINE**

**Course Title; Calculus**

**Code No.: Mth 208-4**

**Semester: Five**

**Program: Environmental Engineering, Pulp & Paper, Water Resources**

**Author: The Mathematics Department**

**Date: August 1998**

**Previous Outline Dated: January 1998**

**Approved:**

**^IAA.AJTJ^**

**Dean**

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**Date**

**Total Credits: 4**

**Prerequisite(s): Mth 220**

**Substitute(s): Mth 551**

**Length of Course: 4 hrs./week**

**Total Credit Hours: 64**

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**I. COURSE DESCRIPTION:**

This course provides an introduction to calculus. It begins with an introduction to derivatives and differentials and their applications and continues with indefinite and definite integrals of algebraic functions and their elementary applications, particularly to mechanics and fluid mechanics. It should be noted that logarithmic, exponential and trigonometric functions are not covered.

**II. STUDENT PERFORMANCE OBJECTIVES:**

The basic objectives are that the student develop an understanding of the methods studied, demonstrate a knowledge of the facts presented and show an ability to use these in the solution of problems. To accomplish these objectives, exercises are assigned. Test questions will be of near difficulty to questions assigned in the exercises. The level of competency demanded is the level required to obtain an overall passing average on the tests. The material to be covered is listed below.

**III. TOPICS:**

- |   |          |
|---|----------|
| 1. Review of plan analytic geometry, straight lines circles and parabola, including equations, properties and graphing of each                              | 6 hours  |
| 2. Derivative calculus including functions, notations, limits, slopes of secants/tangents, delta method, derivative rules, and higher order differentiation | 12 hours |
| 3. Derivative applications including slopes of tangents, normals to curves, curvilinear motion, curve sketching and maximum/minimum applications            | 10 hours |
| 4. Integral calculus involving differentials, anti-derivatives, indefinite, particular and definite integration   | 14 hours |
| 5. Applications of integration - determining area, volumes of solids of revolution, pressure on a submerged plate, work, flow over a weir                   | 20 hours |

**IV. LEARNING ACTIVITIES:**

TOPIC NUMBER	TOPIC DESCRIPTION	REFERENCE CHAPTER ASSIGNMENTS
1.0	Plane Analytic Geometry Review	Chapter 21
1.1	Straight line, slope, graphs, length, intersections	Exercise 21.1 pp. 1,3,21,23,25,27, 29,31.37,39 Exerdse21.2: Odds 1-39

IV. LEARNING ACTIVITIES (cont'd):

TOPIC NUMBER	TOPIC DESCRIPTION	REFERENCE CHAPTER ASSIGNMENTS
1.2	Circle	Exercise 21.3: Odds 1-31
1.3	Parabola	Exercise 21.4: 1-23,29 Exercise 21.7: 1, 7, 9, 11, 21,27,33
<b>2.0</b>	<b>The Derivative</b>	<b>Chapter 23</b>
2-1	Functional notation	Para: 3-1 & 3-2 Exercise 3.1
2.2	Limits	Exercise 23.1: 1-47
2.3	Slope of tangent to curve	Para: 23.2, 1,3,9, 11. 15, 17,21
2.4	Derivative - delta method - meaning	Exercise 23.3: 3, 11, 15, 17, 19,25,26 Exercise 23.4: 1,9, 11.15, 17, 19,23,29
2.5	Derivative of polynomial - by rule	Exercise 23.5: Odds 1-41
2.7	Composite functions - chain rule	Exercise 23.7: Odds 1-21, 25. 37, 39
2.9	Higher derivatives	Exercise 23.9: Odds 1-19, 29,35 Review exercise p. 653 as required
<b>3.0</b>	<b>Applications of Derivatives</b>	<b>Chapter 24</b>
3.1	Tangents and normals	Exercise 24.1: Odds 1-19
3.2	Curvilinear motion	Exercise 24.3; Odds 1-17
3.4	Curve sketching	Exercise 24.5: Odds 1-25
<b>3.5</b>	<b>Maximum/minimum applications</b>	Exercise 24.7 and handout sheet Review exercise as required p. 689
<b>4.0</b>	<b>Integration</b>	<b>Chapter 25</b>
4.1	Differentials	Exercise 25.1: Odds 1-25
4.2	Antiderivatives	Exercise 25.2: Odds 1-29
4.3	Indefinite particular integrals	Exercise 25.3: Odds 1-43
<b>4.4</b>	<b>Definite integrals</b>	Exercise 25.5: Odds 1-33 Review exercise as required

IV. **LEARNING ACTIVITIES** (cont'd):

<b>TOPIC NUMBER</b>	<b>TOPIC DESCRIPTION</b>	<b>REFERENCE CHAPTER ASSIGNMENTS</b>
<b>5.0</b>	<b>Application of Integration</b>	<b>Chapter 26</b>
<b>5.1</b>	Application of indefinite integrals	Exercise 26.1: 3, 7, 11, 17, 27
<b>5.2</b>	Areas	Exercise 26.2; Odds 1-31
<b>5.3</b>	Volumes of revolution, disc, washer and shell methods	Exercise 26.3: Odds
<b>5.4</b>	Work	Exercise 26.6: Odds
<b>5.5</b>	Pressure on submerged plates	Handout sheet
<b>5.6</b>	Flow over weirs	Handout sheet

The student will be expected to attend all classes punctually and do all the assigned work. Work will be assigned from the previously listed exercises in the textbook, and various handout sheets, from time to time.

At the discretion of the instructor, other exercises in the textbook may be used and work may be assigned from handouts supplied by the instructor.

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

1. Text: Basic Technical Mathematics with Calculus. Washing, Aian J., 6\* (metric), Benjamin Cummings
2. Calculator: (Recommended) SHARP Scientific Calculator EL-531L. The use of some kinds of calculators may be restricted during tests.

VI. **EVALUATION PROCESS/GRADING SYSTEM:**

**MAJOR ASSIGNMENTS AND TESTS**

While regular tests will normally be scheduled and announced beforehand, there may be an unannounced test on current work at any time. Such tests, at the discretion of the instructor, may be used for up to 30% of the overall mark.

At the discretion of the instructor, there may be a mid-term exam and there may be a final exam, each of which can contribute up to 30% of the overall mark.

The instructor will provide you with a list of test dates. Tests may be scheduled out of regular Class time.

## VI. EVALUATION PROCESS/GRADING SYSTEM (cont'd):

### ATTENDANCE

It is your responsibility to attend all classes during the semester. Research indicates there is a high correlation between attendance and student success.

If you are absent from class, it is your responsibility to find out what work was covered and assigned and to complete this work before the next class. Your absence indicates your acceptance of this responsibility.

**Unexcused absence from a test may result in a mark of zero ("0").** Absence may be excused on compassionate grounds such as verified illness or bereavement. On return from an excused absence, you should ask your instructor to schedule the writing of a make-up test. Failure to do so will be considered as an unexcused absence.

### METHOD OF ASSESSMENT (GRADING METHOD)

A+	Consistently outstanding	(90% - 100%)
A	Outstanding Achievement	(80% - 89%)
B	Consistently above average achievement	(70% - 79%)
C	Satisfactory or acceptable achievement in all areas subject to assessment	(55% - 69%)
X or R	A temporary grade, limited to situations with extenuating circumstances, giving a student additional time to complete course requirements <b>(See below)</b>	(46% - 54%)
R	Repeat - The student has not achieved the objectives of the course, and the course must be repeated	(0% - 44%)
CR	Credit exemption	

The method of calculating your weighted average will be defined by your instructor. Since grades are based upon averages, it follows that good marks in some tests can compensate for a failing mark in another test.

### Make-Up Test (if applicable)

An "X" grade may be assigned at the end of the regular semester if you have met **ALL** of the following criteria:

- an overall average between 45% and 54% was achieved
- at least 50% of the tests were passed
- at least 80% of the scheduled classes were attended
- all of the topic tests were written

## **VI. EVALUATION PROCESS/GRADING SYSTEM (cont'd):**

If you are assigned an "X" grade, you may convert it to a "C" grade by writing a make-up test on topics agreed to by the instructor. This test will be available at the time agreed to by your instructor.

At the end of the regular term, it is your responsibility to obtain your results from your instructor and, in the event of an "X" grade, to inquire when the make-up test will be available.

The score you receive on this make-up test will replace your original test score and be used to re-calculate your weighted average. If the re-calculated average is 55% or greater, a "C" grade will be assigned. If the re-calculated average is 54% or less, an "R" grade will be assigned.

### **"R" and "X" Grades at the end of the Semester**

If an "X" grade is not cleared by the specified date, it will become an "R" grade. Except for extenuating circumstances, an "X" grade in Math will not be carried into the next semester.

### **"R" Grades during the Semester**

A student with a failing grade and poor attendance (less than 80% attendance) may be given an "R" at any time during the semester.

## **VII. SPECIAL NOTES:**

Students with special needs (e.g. physical limitations, visual impairments, hearing impairments, learning disabilities), are encouraged to discuss required accommodations with the professor and/or contact the Special Needs Office.

### **Advanced Standing**

Students who have completed an equivalent post-secondary course must bring relevant documents to the Coordinator, Mathematics Department:

- a copy of course outline
- a copy of the transcript verifying successful completion of the equivalent course

Note: A copy of the transcript must be on file in the Registrar's Office.

## **VIII. PRIOR LEARNING ASSESSMENT:**

Students who wish to apply for advanced credit in the course should consult the instructor or the Prior Learning Assessment Office (E2203).