

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



COURSE OUTLINE

Course Title: Technical Mathematics

Code No.: Mth 613-4

Semester: Two

Program: Aviation

Author: The Mathematics Department

Pate: August 1998      Previous Outline Pated: Jan. 1998

Approved: Judith Morris      June 1998  
**Dean**      **Date**

Total Credits: 4      Prerequisite(s): None

Substitutions: Mth 551

Length of Course: 4 hrs./week      Total Credit Hours: 64

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*For additional information, please contact Judith Morris, School of Liberal Studies, Creative Arts and Access, (705) 759-2554, Ext.516*

**I. COURSE DESCRIPTION:**

The course includes topics in Plane Analytic Geometry, Introduction to Calculus including derivatives and integration of algebraic functions, and applications of differentiation and simple integration.

**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 equal 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 and on the following page.

**III. TOPICS TO BE COVERED**

**Approximate Time Frame**

|  |          |
|--|----------|
| 1. Plane Analytic Geometry of straight lines and conic sections including equations, properties and graphing of each   | 12 hours |
| 2. Derivative calculus including functions, notations, limits, slopes of secants / tangents, delta method, derivative ailes, composite and implicit functions and higher order differentiation | 14 hours |
| 3. Derivative applications including slopes of tangents, normals and curves, curvilinear motion, related rates, curve sketching and maximum / minimum applications                             | 14 hours |
| 4. Integral calculus involving differentials, anti-derivatives, indefinite, particular and definite integration areas  | 14 hours |

**IV. LEARNING ACTIVITIES:**

| <b>TOPIC NUMBER</b> | <b>TOPIC DESCRIPTION</b>                               | <b>REFERENCE CHAPTER ASSIGNMENTS</b>  |
|---------------------|--|---|
| <b>1.0</b>          | <b>Plane Analytic Geometry</b>                         | <b>Chapter 21</b>   |
| 1.1                 | Straight line, slope, graphs, length and intersections | Exercise 21.1 - Pages 1 , 3, 21,23,25,27,29,31,37,39<br>Exercise 21.1 - Odds 1-39 |
| 1.2                 | Circle   | Exercise 21.3- Pages 1-31 (Odds)  |
| 1.3                 | Parabola   | Exercise 21.4 - Pages 1-21, 29<br>Exercise 21.7 - Pages 1, 7, 9, 11,21,27         |

IV. LEARNING ACTIVITIES (conf d):

| TOPIC NUMBER | TOPIC DESCRIPTION                     | REFERENCE CHAPTER ASSIGNMENTS   |
|--------------|---------------------------------------|---|
| 1.4          | Brief review of ellipse and hyperbola | Exercise 21.5 - Pages 1-21, 35<br>Exercise 21.7 - Pages 13, 15, 23            |
| <b>2.0</b>   | <b>The Derivative</b>                 | <b>Chapter 23</b>   |
| 2.1          | Functional notation                   | Para: 3-1, 3-2<br>Exercises 3.1, 3.2 - Pages 1-19 (Odds)                      |
| 2.2          | Limits                                | Exercise 23.1 - Pages 1-47  |
| 2.3          | Slope of tangent to curve             | Exercise 23.2 - Page 9, 11, 15, 17.21<br>Exercise 23.3 - Pages 3-19 (Odd). 25 |
| 2.4          | Derivative •- delta method            | Exercise 23.4 - Pages 11, 17, 29  |
| 2.5          | Derivative of polynomial by rule      | Exercise 23.5 - Pages 1-41 (Odds)   |
| 2.6          | Product and quotient rule             | Exercise 23.6 - Pages 1-37 (Odds)   |
| 2.7          | Composite functions - chain rule      | Exercise 23.7 - Pages 1-27 (Odds), 37. 39                                     |
| 2.8          | Implicit functions                    | Exercise 23.8 - Pages 1-15 (Odds), 21, 23, 25, 31                             |
| 2.9          | Higher derivatives                    | Exercise 23.9 - Pages 1-19 (Odds), 29-39<br>Review exercise as required       |
| <b>3.0</b>   | <b>Applications of Derivatives</b>    | <b>Chapter 24</b>   |
| 3.1          | Tangents and Normals                  | Exercise 24.1 - Pages 1-19 (Odds)   |
| 3.2          | Curvilinear motion                    | Exercise 24.3 - Pages 1-17 (Odds)   |
| 3.3          | Related rates                         | Exercise 24.4 - Pages 1-21 (Odds) and handout                                 |
| 3.4          | Curve sketching                       | Exercise 24.5 - Pages 1-25 (Odds)   |
| 3.5          | Maximum / minimum applications        | Exercise 24.7 - Pages 1-27 (Odds)   |

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

| TOPIC NUMBER | TOPIC DESCRIPTION                              | REFERENCE CHAPTER ASSIGNMENTS     |
|--------------|--|-----------------------------------|
| 4.0          | INTEGRATION                                    | Chapter 25 and 26                 |
| 4.1          | Differentials                                  | Exercise 25.1 - Pages 1-25 (Odds) |
| 4.2          | Antiderivatives                                | Exercise 25.2 - Pages 1-29 (Odds) |
| 4.3          | Indefinite integral                            | Exercise 25.3 - Pages 1-43 (Odds) |
| 4.4          | Definite integrals                             | Exercise 25.5 - Pages 1-35 (Odds) |
| 4.5          | Area under a curve and area between two curves | Exercise 26.2 - Pages 1-31 (Odds) |

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

1. Basic Technical Mathematics with Calculus. Washington, Alan J., 6<sup>th</sup> (metric) Edition, Benjamin Cummings, 1995
2. Calculator: (Recommended) SHARP Scientific Calculator EL-531G.  
*Note: 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<br>in all areas subject to assessment  | (55% - 69%)  |
| X or R | A temporary grade, limited to situations<br>with extenuating circumstances, giving a<br>student additional time to complete course<br>requirements <b>(See below)</b> | (45% - 54%)  |
| R      | Repeat - The student has not achieved<br>the objectives of the course, and the<br>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.

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

### **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

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.

**VII. SPECIAL NOTES (cont'd):**

**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).