

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY  
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: TECHNICAL HATHEMATICS

CODE NO MTH 613-4 SEMESTER II

PROGRAM: AVIATION

AUTHOR W.O. MAKI

DATE JULY 1993 PREVIOUS OUTLINE DATED: JULY 1992

APPROVED: DE^

Technical Mathematics

MTH 613-4

COURSE NAME

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TOTAL CREDIT HOURS: 68

PREREQUISITE(S): MTH 612 or Grade 13 Relations & Functions and Grade 13 Calculus

**I. PHILOSOPHY/GOALS:**

The course includes topics in Plane Analytic Geometry, introduction to Calculus including derivatives and integration of algebraic functions; 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:**

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

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IV. LEARNING ACTIVITIES:

TOPIC	PERIODS	TOPIC DESCRIPTION	REFERENCES
1.	12	<u>Plane Analytic Geometry</u>	Ch. 20
	1.1	Straight line, slope, graphs, length, intersections	Ex. 20.1: 1,3,21,23,25,27,29, 31,37,39
	1.2	Circle	Ex. 20.2: Odds 1-39
	1.3	Parabola	Ex. 20.3: 1, 3-31 Ex. 20.4: 1-23,29 Ex.20.7: 1,7,9,11,21, 27
	1.4	Brief review of ellipse and hyperbola	Ex.20.5: 1-21,31 Ex.20.7: 13,15,23 Ex.20.6: 1-27 Ex.20.7: 3, 17,27
2.	14	The Derivative	Ch. 22
	2,.1	Functional notation	Para: 2-1, 2-2 Ex. 2.1, 2.2
	2,.2	Limits	Ex, 22.1 1-47
	2,.3	Slope of tangent to curve	Ex, 22.2 9,11,15,17,21
	2,.4	Derivative - delta method	Ex, 22.3:11,15, 17,19,26
	2,.5	Derivative of polynomial - by rule	Ex. 22.4: 11,17,29
	2,.6	Product and quotient rule	Ex. 22.5: Odds 1-41
	2,.7	Composite functions -• chain rule	Ex. 22.6: Odds 1-37 Ex,22.7: Odds 1-27, 37, 39
	2.8	Implicit functions	Ex. 22.8: Odds 1-15, 21,23,25,31
	2.9	Higher derivatives	Ex. 22.9: Odds 1-19, 29-35 Review Ex. as required

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**IV. LEARNING ACTIVITIES:**

TOPIC	PERIODS	TOPIC DESCRIPTION	REFERENCES
14		<u>Applications of Derivatives</u>	Ch. 23
	3.1	Tangents and Normals	Ex. 23.1: Odds 1-19
	3.2	Curvilinear motion	Ex. 23.3: Odds 1-17
	3.3	Related rates	Ex. 23.4: Odds 1-21
	3.4	Curve sketching	and handout
	3.5	Maximum/minimum applications	Ex. 23.5: Odds 1-25 Ex. 23.7
14		Integration	Ch. 24 & 25
	4.1	Differentials	Ex. 24.1: Odds 1-25
	4.2	Antiderivatives	Ex. 24.2: Odds 1-29
	4.3	Indefinite integral	Ex. 24.3: Odds 1-43
	4.4	Definite integrals	Ex. 24.5 Odds 1-33
	4.5	Area under a curve and area between two curves	Ex. 25.2 Odds 1-31

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.

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.

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**V. EVALUATION METHODS: (INCLUDES ASSIGNMENTS, ATTENDANCE REQUIREMENTS ETC.)**

The student's progress will be assessed by written tests. The student's final grade is based upon an average of the test results. ATTENDANCE AT ALL TESTS IS REQUIRED. Unexcused absence from a test will result in a mark of zero for that test. A student may be prevented from attending a test by illness or bereavement. Upon return to classes, the student must see the instructor at the end of the first mathematics class attended to arrange a time and place for a make up test. In addition, if the absence is due to illness the student must present a note from the student's doctor or from the College nurse.

If, at the end of the semester, a student has an average between 45% and 54%, the instructor will consider permitting the student to do make up work in hope of raising his/her standing to a passing level. If a student has not written all of the topic tests, or if the student has attended fewer than 80% of the scheduled classes, or if the student has not done all of the assigned work during the semester, then the make up privilege will not be granted. At the discretion of the instructor a student who is granted the make up privilege may be required to write one topic test in hope of raising his/her average or he/she may be required to write an examination on the whole course. Such tests and examinations are not provided for the purpose of obtaining grades higher than "C",

Due to circumstances beyond the control of the instructor, the time available for the student to prepare for the make up test or examination is usually so limited that the student has little opportunity to improve. Hence, the student should make diligent efforts to avoid any need for make up privileges.

Make up tests will not be made available in this course in any other circumstances than those described above.

The final mark (grade) will be based on the average results of several tests.

GRADING: A+ = 90 - 100%  
A = 80 - 89%  
B = 65 - 79%  
C = 55 - 64%  
R = 0 - 54%

A passing grade will be based on a MINIMUM average of 55%.

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**V. EVALUATION METHODS:** (cont'd)

As in any other subject the student is preparing for his working career as well as studying the subject. Hence, on tests the student is expected to produce neat, legible, well laid out solutions which show clearly how the answers were obtained. If anything less is required, this will be indicated in the test. Failure to show such solutions may render correct answers worthless. As happens in the workplace if anything you put on paper can be misread it will be. In addition to loss of marks on individual questions, up to 25% of the marks available on a test can be subtracted as a penalty for untidiness. Marks lost in such penalties can be redeemed by a student willing to put forth the required effort. Proper solutions as described above should be produced for all your assigned work. Such practice will make it easier for you to produce the required quality of work on tests. If when you look at a page of your work it makes you feel proud of its appearance, than you are probably on target.

Marks allotted to each question on a test are usually shown. Please enquire if they are not. The questions on a test do not necessarily have equal values.

Full attendance at all scheduled classes is required. Any student with unexcused absences exceeding 10% of the classes will have his math grade reduced, provided that this does not reduce the grade below a "C".

**VI. REQUIRED STUDENT RESOURCES:**

Basic Technical Mathematics with Calculus, Washington, Alan J., 5th (metric) Ed., Benjamin Cummings.

**VII. SPECIAL NOTES:**

Students with special needs (e.g. physical limitations, visual impairments, hearing impairments, learning disabilities) are encouraged to discuss required accommodations confidentially with the instructor.

Your instructor reserves the right to modify the course as he/she deems necessary to meet the needs of students.