SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE
CALCULUS

CODE NO.:
MTH 208-4   V   4 Hrs/Week

SEMESTER

PROGRAM:
ENV. ENGINEERING/ PULP & PAPER/ WATER RESOURCES

AUTHOR
W. MACQUARRIE

DATE
AUGUST 1993   JUNE 1991

PREVIOUS OUTLINE DATED:

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DATE

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TOTAL CREDIT HOURS: 64

PREREQUISITE(S): MTH220

I.   PHILOSOPHY/GOALS:

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 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.

III.   TOPICS TO BE COVERED:

(1) Review of Plane Analytic Geometry, straight lines, circles and
    parabola, including equations, properties and graphing of each.
                                              6 hrs.

(2) Derivative Calculus including functions, notations, limits, slopes
    of secants/tangents, delta method, derivative rules, and higher
    order differentiation.
                                              12 hrs.

(3) Derivative Applications including slopes of tangents, normals to
    curves, curvilinear motion, curve sketching and maximum/minimum
    applications.
                                              10 hrs.

(4) Integral Calculus involving differentials, anti-derivatives,
    indefinite, particular and definite integration.
                                              14 hrs.

(5) Applications of Integration - determining area, volumes of solids
    of revolution, pressure on a submerged plate, work, flow over a
    weir.
                                              2 0 hrs.

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IV. LEARNING ACTIVITIES:

TOPIC	PERIODS	TOPIC DESCRIPTION	REFERENCE
1.		Plane Analytic Geometry Review	Ch. 20
		1.1 Straight line, slope, graphs, length, intersections	Ex. 20.1: 1,3,21,23,,25,27,29, 31,37,39
			Ex. 20.2: Odds 1-39
		1.2 Circle	Ex, 20.3: 1, 3-31
		1.3 Parabola	Ex. 20.4: 1-23,29
			Ex. 20.7:
		1,7,9,11,21,	27
	12	The Derivative	Ch. 22
		2.1 Functional notation	Para: 2-1, 2-2
			Ex. 2.1
		2.2 Limits	Ex. 22.1, 1-47
		2.3 Slope of tangent to curve	Ex. 22.2
			Para: 22-2 Ex. "C" 9,11,15,17,21
		2.4 Derivative - delta method meaning	Ex. 22.3: 11,15, 17,19,26 9,11,13,17,
			Ex. 22.4 23,29
		2.5 Derivative of polynomial - by rule	Ex. 22.5 Odds 1-41
		2.7 Composite functions - chain rule	Ex. 22.7 Odds 1-21, 25,37,39
		2.9 Higher derivatives	Ex. 22.9: Odds 1-19, 29-35
			Review Ex. Pg.689 as required
	10	Applications of Derivatives	Ch. 23
		3.1 Tangents and Normals	Ex. 23..1: Odds 1-19
		3.2 Curvilinear motion	Ex. 23..3: Odds 1-17
		3.4 Curve sketching	Ex. 23..5: Odds 1-25
		3.5 Maximum/minimum applications	Ex. 23..7 and Hand Out Sheet,
			Review Ex. as Req'd

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IV. LEARNING ACTIVITIES:

TOPIC PERIODS	TOPIC DESCRIPTION	REFERENCE
14	<u>Integration</u>	Ch. 24
	4 ,1 Differentials	Ex, 24..1: Odds 1-25
	4.2 Antiderivatives	Ex. 24..2: Odds 1-29
	4.3 Indefinite particular integrals	Ex. 24..3: Odds 1-43
	4.4 Definite integrals	Ex. 24..5: Odds 1-33
		Review Ex . - as Req'd
2 0	<u>Application of Integration</u>	Ch. 25
	5.1 Application of Indefinite Integrals	Ex. 25.1: 3,7,11,17,27
	5.2 Areas	Ex. 25.2: Odds, 1-31
	5.3 Volumes of revolution, disc, washer & shell methods	Ex. 25.3: Odds
	5.4 Work	Ex. 2 5.6: Odds
	5.5 Pressure on submerged plates	Hand Out Sheet
	5.6 Flow over weirs	Hand Out 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.

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

The student's progress will be assessed by periodic written tests. The student's final grade is based upon a weighted 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 to 100%
                  A   = 80 to 89%
                  B   = 65 to 79%
                  C   = 55 to 64%
                  R   = 0 to 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.