SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

Sault College

COURSE OUTLINE

COURSE TITLE: Calculus

CODE NO. : OEL847   **SEMESTER:**

PROGRAM: Electrical/Electronics/Computer Studies

AUTHOR: Updated by B. Hamel / Fred MacWilliam

DATE: May 2011   **PREVIOUS OUTLINE DATED:** June 2009

APPROVED:

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                             DEAN   **DATE**

TOTAL CREDITS: 4

PREREQUISITE(S): MTH143/OEL840

HOURS/WEEK: 4

Calculus

SA-OEL847

I.   COURSE DESCRIPTION:

The basic concepts of calculus are introduced through an emphasis on applications and examples. Topics include limits, simple derivatives, derivatives of trigonometric and logarithmic functions, applications of derivatives, curve sketching, integration, and applications of integration.

II.   LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

Topic 1:
1. Evaluate limits of algebraic functions.
2. Approximate the slope of a tangent to a curve.
3. Find the derivative of an algebraic function using the delta method.
4. Find instantaneous rates of change of a function using derivatives.
5. Find the derivative of a polynomial using a rule.
6. Find derivatives of other algebraic functions (products and quotients) using rules for differentiation.
7. Find the derivative of a power of a function - Chain rule.
8. Find the derivative of an implicit function.
9. Find higher derivatives of algebraic functions

Topic 2:
1. Find slopes and equations of tangent and normal lines.
2. Compute velocities and accelerations for curvilinear motion.
3. Solve related rate problems.
4. Make graphs of non-linear functions using derivatives.
5. Make graphs of discontinuous functions using derivatives, asymptotes, intercepts.
6. Solve applied maximum-minimum problems.

Topic 3:
1. Use differentials to compute small change in a function.
2. Find an anti-derivative using derivative rules.
3. Use the basic rule for integration of algebraic functions.
4. Determine approximate areas under curves from graphs.
5. Determine exact areas under curves by integration - the fundamental theorem of integral calculus.
6. Evaluate other algebraic definite integrals.

Topic 4:
1. Solve problems involving distance-velocity-acceleration, current-voltage-charge using integration.
2. Find areas (between two curves) using horizontal and vertical elements and definite integrals.
3. Find the volume of a solid of revolution using the disk or shell method.

Topic 5:
1. Find derivatives of expressions containing sine or cosine functions.
2. Find derivatives of other trigonometric functions.
3. Find derivatives of inverse trigonometric functions
4. Solve worded problems which involve trigonometric functions.
5. Find derivatives of logarithmic functions - and constant base.
6. Find derivatives of exponential functions - any constant base.
7. Solve worded problems involving logarithmic of exponential functions.

III. TOPICS:

1. The Derivative

2. Applications of the Derivative

3. Integration

4. Applications of Integration

5. Differentiation of Transcendental Functions

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

1. Basic Technical Mathematics with Calculus, Metric version (includes MyMathLab Package and Student Solution Manual). Allyn J. Washington. Addison Wesley. 8th or 9th Edition.

2. Calculator: (Recommended) SHARP Scientific Calculator EL-531G. The use of some kinds of calculators may be restricted during tests.

V. EVALUATION PROCESS/GRADING SYSTEM:

The evaluation will consist of 4 online, open book multiple choice tests which will be 90 minutes in length and cover the 5 modules. The tests have a value of 48% of the total. There will also be a 3 hour formal written exam requiring full solutions. This will be an open book exam and will be valued at 52% of the total.

VI. SPECIAL NOTES

Special Needs:
If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to identify yourself to your registering college and also to your instructor. Please ensure that your registering college submits a plan to the OntarioLearn coordinator.

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.

Course Outline Amendments:
The instructor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.