DAWSON
COLLEGE

Mathematics Department
Calculus I (Electronics Engineering Technology)
201-NYA-05

IMPORTANT NOTICE: This is part 1 of a two part course outline. Part 2 of the outline will be distributed by individual instructors during the first week of classes.

OBJECTIVES:
This course consists of an introduction to single-variable calculus. Topics covered include limits and continuity, the derivative and differentiation, applications of the derivative to curve sketching, maximum/minimum and related rates problems, anti-differentiation, and the indefinite integral.

Specific to the Electronics Engineering Technology Program are the topics: the definite integral, areas by integration as well as applications of differentiation and integration to electronics.

COURSE COMPETENCIES:
This course contributes to the partial achievement of the competency:
041R: To implement mathematical models related to electronics.

Elements of the Competency 041R:
1. Become familiar with the situation requiring the implementation of a model.
2. Select the model.
3. Apply the model to the situation.
4. Assess the results.
5. Present the results.

PREREQUISITE:
Applied Mathematics *(201-943-DW)*

PONDERATION:
3-2-3

COLLEGE EVALUATION POLICY:
The Institutional Student Evaluation Policy (ISEP) is designed to promote equitable and effective evaluation of student learning and is therefore crucial policy to read and understand. The policy describes the rights and obligations of students, faculty, departments, programs and the College administration with regard to evaluation in all your courses, including grade reviews and resolution of academic grievance. The ISEP is available on the Dawson website.

TERMWORK:
The term grade is based on a minimum of $4\frac{1}{2}$ hours of tests/quizzes.

FINAL EXAMINATION:
The Final Examination will be a supervised, comprehensive examination held during the formal examination period. There will be no exemptions.

GRADING POLICY:
The final grade shall consist of:

Termwork for 50% of final grade and
Final Examination for 50% of final grade

STANDARD OF PERFORMANCE:
In order to pass this course the student must obtain a final grade of at least 60%.

TEXTBOOK:
Basic Technical Mathematics with Calculus - SI Version (9th Ed.) by Allyn J. Washington

REFERENCES:
Any standard textbook covering single variable calculus.

CALCULATORS:
A calculator without text storage or graphing capabilities is allowed for the Final Examination.

FORMULA SHEETS:
No formula sheet will be permitted for quizzes, class tests nor for the Final Examination.

DEPARTMENT WEBSITE:
For final examinations from previous years and other useful information consult the departmental website:
Go to `http://www.dawsoncollege.qc.ca`
→ go to PROGRAMS
→ go to DISCIPLINES
→ go to MATHEMATICS

MATH TUTORIAL ROOM:
Volunteer math teachers are available for help in room 7B.1. The schedule of available teachers is available on the door of the tutorial room and the math department website.

METHODOLOGY:
Lectures and problem solving sessions.

ATTENDANCE AND COURSE PARTICIPATION REQUIREMENTS:
Students should refer to the Institutional Student Evaluation Policy (ISEP section III-C) regarding attendance.

LITERACY STANDARDS:
Problem solving is an essential component of this course. Students will be expected to analyze problems stated in words, to present their solutions logically and coherently, and to display their answers in a form corresponding to the statement of the problem, including appropriate units of measurement. Marks will be deducted for work which is inadequate in these respects, even though the answers may be numerically correct.

STUDENTS' OBLIGATIONS:

a. Students have an obligation to arrive on time and remain in the classroom for the duration of scheduled classes and activities.
b. Students have an obligation to write tests and final examinations at the times scheduled by the teacher or the College. Students have an obligation to inform themselves of, and respect, College examination procedures.
c. Students have an obligation to show respectful behavior and appropriate classroom comportment. Should a student be disruptive and/or disrespectful, the teacher has the right to exclude the disruptive student from learning activities (classes) and may refer the case to the Director of Student Services under the Student Code of Conduct.
d. Electronic/communication devices (including cellphones, mp3 players, etc.) have the effect of disturbing the teacher and other students. All these devices must be turned off and put away. Students who do not observe these rules will be asked to leave the classroom.

Everyone has the right to a safe and non-violent environment. Students are obliged to conduct themselves as stated in the Student Code of Conduct and in the ISEP section on the roles and responsibilities of students. (ISEP section II-D)

ACADEMIC INTEGRITY:

Cheating in Examinations, Tests, and Quizzes:

Cheating includes any dishonest or deceptive practice relative to formal final examinations, in-class tests, or quizzes. Such cheating is discoverable during or after the exercise in the evaluation process by the instructor. Such cheating includes, but is not limited to:

a. copying or attempting to copy another's work.
b. obtaining or attempting to obtain unauthorized assistance of any kind.
c. providing or attempting to provide unauthorized assistance of any kind.
d. using or possessing any unauthorized material or instruments which can be used as information storage and retrieval devices.
e. taking an examination, test, or quiz for someone else.
f. having someone take an examination, test, or quiz in one's place.

Unauthorized Communication:

Unauthorized communication of any kind during an examination, test, or quiz is forbidden and subject to the same penalties as cheating.

Plagiarism on Assignments and the Comprehensive Assessment:

Plagiarism is the presentation or submission by a student of another person's assignments or Comprehensive Assessment as his or her own. Students who permit their work to be copied are considered to be as guilty as the plagiarizer.

Penalties:

Cheating and plagiarism are considered extremely serious academic offences. Action in response to an incident of cheating and plagiarism is within the authority of the teacher. Penalties may range from zero on a test, to failure of the course, to suspension or expulsion from the college.

According to ISEP, the teacher is required to report to the Sector Dean all cases of cheating and plagiarism affecting a student's grade (see ISEP section IV-C).

POLICY ON RELIGIOUS OBSERVANCE AND/OR INTENSIVE COURSE CONFLICTS:

If a student is attending an intensive course, the student must inform the teacher, within the first two weeks of class, of the specific dates of any anticipated absences. Students who intend to observe religious holidays or who take intensive courses must inform their teachers in writing as prescribed in the ISEP Policy on Religious Observance (ISEP Section III-D).
A form for this purpose is attached to this course outline.

Excerpt from *ISEP Section III-D*:
Students who wish to observe religious holidays must inform each of their teachers in writing within the first two weeks of each semester of their intent to observe the holiday so that alternative arrangements convenient to both the student and the teacher can be made at the earliest opportunity. The written notice must be given even when the exact date of the holiday will not be known until later. Students who make such arrangements will not be required to attend classes or take examinations on the designated days, nor be penalized for their absence.

It must be emphasized, however, that this College policy should not be interpreted to mean that a student can receive credit for work not performed. It is the student's responsibility to fulfill the requirements of the alternative arrangement.

RELIGIOUS OBSERVANCE/ INTENSIVE COURSES FORM

Students who intend to observe religious holidays or who take intensive courses must inform their teachers in writing as prescribed in the ISEP Policy on Religious Observance. (ISEP Section III-D)

The following form must be submitted within the first two weeks of classes.

Name: _____

Student Number: _____

Course: _____

Teacher: _____

Date of Absence:	Reason for Absence:
_____	_____
_____	_____
_____	_____
_____	_____

Course Content by Chapter

Chapter 23 The Derivative (3 weeks):

Textbook Section	Topic	Relevent Exercises
§23.1 Limits	• Limits • Continuity	p.656 25-48, 56-64 p.656 5-24
§23.2 The Slope of a Tangent to a Curve	• Slope of a tangent line at a specific point • Slope of a tangent line at a general Point	p.660 7-10 p.660 11-22
§23.3 The Derivative	• Definition of the derivative	p.664 3-40
§23.4 The Derivative as an Instantaneous Rate of Change	• Applications to velocity/acceleration • Applications to electronics	p.668 11-24, 27, 28 p.668 29, 33
§23.5 Derivatives of Polynomials	• Derivatives of polynomials • Applications to velocity/acceleration • Applications to electronics	p.672 5-28, 37-41, 43, 49 p.672 29-36, 44 p.672 47
§23.6 Derivatives of Products and Quotients	• Derivatives of products and quotients (polynomial) • Applications to velocity/acceleration • Applications to electronics	p.676 3-32, 35, 39-43 p.676 49 p.676 45, 47, 52, 55
§23.7 Derivative of a Power of a Function	• Derivatives of powers (polynomial) • Applications to velocity/acceleration • Applications to electronics	p.682 5-36, 41-45 p.682 47, 49 p.682 52, 57, 58
§23.8 Differentiation of Implicit Functions	• Implicit differentiation (polynomial) • Applications to electronics	p.686 3-38 p.686 39, 45
§23.9 Higher Derivatives	• Higher order derivatives of polynomials • Applications to velocity/acceleration • Applications to electronics	p.689 3-36, 41-44 p.689 37-40, 47, 48 p.689 46, 49
Chapter 23 Review	• Limits • Definition of derivative • Derivatives (polynomials) • Implicit differentiation (polynomial) • Applications to velocity/acceleration • Applications to electronics	p.691 1-12, 45, 51 p.691 13-20 p.691 21-34, 37-44, 46-48, 53-56 p.691 35, 36 p.691 59, 60, 62, 64, 66 p.691 65, 67, 71, 75

Chapter 24 Applications of the Derivative (2 weeks):

Textbook Section	Topic	Relevent Exercises
§24.1 Tangents and Normals	• Tangent and normal lines • Tangent and normal lines involving implicit differentiation • Applications to electronics	p.696 3-5, 7-9, 11-17, 20 p.696 6, 10, 18, 21, 23 p.696 27
§24.2 Newton's Method for Solving Equations	• Using Newton's method • Applications to electronics	p.700 5-19 p.700 28
§24.4 Related Rates	• Related rates problems involving electronics • Other related rates problems	p.707 11, 14, 16, 30 p.707 3-6, 12, 15, 21, 22, 24-28, 35, 37-43
§24.5 and §24.6 Using Derivatives in Curve Sketching	• Sketching polynomials • Sketching rational functions and functions involving square roots • Sketching functions related to electronics	p.714 5-32 p.719 2-18 p.714 41 and p.719 26, 28
§24.7 Applied Maximum/Minimum Problems	• Max/min problems related to electronics • Other max/min problems	p.724 5, 7, 11, 14, 38, 42 p.724 3, 13, 16-26, 28-34, 43, 44, 51, 52
Chapter 24 Review	• Tangent and Normal Lines • Newton's Method • Related rates problems involving electronics • Other related rates problems • Curve sketching • Max/min problems related to electronics • Other max/min problems	p.731 1-6, 41, 42 p.731 13-16, 44 p.731 50, 58 p.731 47, 66, 67, 70, 71, 75, 80 p.731 17-24, 55, 56 p.731 53, 67 p.731 69, 73, 76, 77, 79

Chapter 27 Differentiation of Transcendental functions (3 weeks):

Textbook Section	Topic	Relevent Exercises
§27.1 Derivatives of the Sine and Cosine Functions	• Derivatives of sine and cosine functions	p.801 3-34, 43-46, 49
	• Implicit differentiation of sine and cosine functions	p.801 41, 42
	• Applications to velocity/acceleration	p.801 50, 53
	• Applictions to electronics	p.801 51, 54
§27.2 Derivatives of the Other Trigonometric Functions	• Derivatives of trigonometric functions	p.804 3-32, 43-47
	• Implicit differentiation of trig. functions	p.804 33, 34
	• Applications to velocity/acceleration	p.804 48, 49, 51
	• Applications to electronics	p.804 50
§27.3 Derivatives of Inverse Trigonometric Functions	• Derivatives of inverse trigonometric functions	p.807 3-31, 34, 39, 41, 42, 45-48
	• Implicit differentiation of inverse trig. functions	p.807 32, 33
	• Applications to velocity/acceleration	p.807 48, 49, 51
	• Applications to electronics	p.807 51
§27.4 Applications (Trigonometric Functions)	• Tangent and normal lines	p.811 4, 5, 9, 10
	• Related rates problems involving electronics	p.811 20
	• Other related rates problems	p.811 25-28
	• Newton's method	p.811 11, 12
	• Max/min problems	p.811 14, 33
	• Applications to velocity/acceleration	p.811 17
	• Applications to electronics	p.811 15, 16
§27.5 Derivative of the Logarithmic Function	• Derivatives of logarithmic functions	p.816 3-31, 40-42, 45, 46, 53, 54
	• Implicit differentiation of logarithmic functions	p.816 32-34
	• Logarithmic differentation	p.816 47, 48
	• Applications to electronics	p.816 50, 56
§27.6 Derivative of the Exponential Functions	• Derivatives of exponential functions	p.819 3-24, 27-32, 36-38, 43-52
	• Implicit differentiation of exponential functions	p.819 25, 26
	• Applications to electronics	p.819 53
§27.8 Applications (Logarithmic and Exponential Functions)	• Tangent and normal lines	p.826 17-20
	• Newton's Method	p.826 21-22, 38
	• Applications to velocity/acceleration	p.826 39, 40
	• Applications to electronics	p.828 23, 25, 28, 30, 34, 35
Chapter 27 Review	• Derivatives of transcendental functions	p.828 1-31, 35, 36, 38-40, 57, 58
	• Implicit differentiation of transcendental functions	p.828 32-34, 37
	• Tangent and normal lines	p.828 45-48
	• Newton's method	p.828 59, 60, 92
	• Related rates problems	p.828 84, 87
	• Applications to velocity/acceleration	p.828 67, 70
	• Applications to electronics	p.828 71, 82, 88

Chapter 25 Integration (2 weeks):

Textbook Section	Topic	Relevent Exercises
§25.1 Antiderivatives	• Antiderivatives	p.731 5-40
§25.2 The Indefinite Integral	• Indefinite integrals involving polynomials • Applications to velocity/acceleration • Applications to electronics	p.741 5-40, 47-49, 59, 60 p.741 50 p.741 53, 54, 56
§25.3 The Area Under a Curve	• Approximating areas under a curve	p.747 5-23
§25.4 The Definite Integral	• Definite integrals involving polynomials • Applications to electronics	p.750 3-38, 41 p.750 42, 50
§25.5 The Trapezoid Rule	• Trapezoid Rule	p.753 3-14, 19, 20
§25.6 Simpson's Rule	• Simpson's Rule	p.757 3-12, 15, 16, 18
Chapter 25 Review	• Indefinite integrals involving polynomials • Definite integrals involving polynomials • Trapezoid Rule • Simpson's Rule • Applications to electronics	p.758 1-10, 13-16, 19-22, 25, 26, 31, 32, 54, 58 p.758 11, 12, 17, 18, 23, 24, 29, 30, 34-36, 48 p.758 37, 39, 45, 46, 50 p.758 41, 47, 51 p.758 53, 56, 7 (Practice Test)

Chapter 26 Applications of Integration (2 weeks):

Textbook Section	Topic	Relevent Exercises
§26.1 Applications of Integration	• Applications to velocity/acceleration • Applications to electronics	p.764 3-16 p.764 17-24, 27
§26.2 Areas by Integration	• Area between curves • Applications to electronics	p.769 3-30, 37, 38 p.769 44
§26.6 Other Applications (**time permitting*)	• Work done by a variable force • Force due to liquid pressure • Average value of a function	p.791 5-20 p.791 21-30 p.791 31-33
Chapter 26 Review	• Applications to velocity/acceleration • Applications to electronics • Area between curves • Work done by a variable force (**time permitting*) • Force due to liquid pressure (**time permitting*) • Average value of a function (**time permitting*)	p.794 1-6, 41, 53 p.794 8-10 p.794 13-20, 39, 40 p.794 37, 38, 44 p.794 42, 49, 50 p.794 51, 52

Chapter 28 Methods of Integration (2 weeks) :

Textbook Section	Topic	Relevent Exercises
§28.1 The General Power Formula	• Indefinite integrals • Definite integrals • Areas by integration • Applications to electronics	p.834 3-8, 11-16, 19-24, 27-30, 35, 36 p.834 17, 18, 25, 26 p.834 31, 34 p.834 39
§28.2 The Basic Logarithmic Form	• Indefinite integrals • Definite integrals • Applications to electronics	p.838 3-10, 13-18, 21-28, 33, 34, 37, 40 p.838 11, 12, 19, 20, 29, 30, 32, 38, 39 p.838 45, 48
§28.3 The Exponential Form	• Indefinite integrals • Definite integrals • Areas by integration • Applications to electronics	p.841 3-10, 13-16, 19-24, 27, 28, 31-34, 36 p.841 11, 12, 17, 18, 25, 26, 42 p.841 29, 30, 40 p.841 41
§28.4 The Basic Trigonometric Forms (**time permitting*)	• Indefinite and definite integrals • Areas by integration • Applications to electronics	p.845 3-26, 31 p.845 27, 28 p.845 36
§28.6 Inverse Trigonometric Forms (**time permitting*)	• Indefinite and definite integrals	p.853 3-30
Chapter 28 Review	• Indefinite integrals • Definite integrals • Areas by integration • Applications to electronics	p.873 1-3, 7-8, 15, 16, 19-21, 23, 25-27, 41, 42, 49, 54 p.873 4, 5, 10, 11, 28, 37 p.873 60 p.873 76