DAWSON
COLLEGE

Mathematics Department
Differential Calculus
201-SN2-RE Section 14
Fall 2024

Instructor:	Yann Lamontagne
Office:	7B.16
Office Hours and Encadrement:	Office hours are posted outside the office 7B.16 and on the website. If there is a time conflict with the posted office hours, then to schedule an in-person meeting send an e-mail with your availability.
Telephone:	(514) 931-8731 #4137
E-mail:	`ylamontagne@dawsoncollege.qc.ca`
Website:	`http://www.obeymath.org` The solutions to the evaluations as well as announcements and additional examples are posted on the website. The material of previously taught courses is also available.
Teacher Accessibility:	For assistance with class material, see me during my office hours. You can also communicate with me via email, under normal circumtances a reply can be expected within 48 hours.
Term Work:	*Term work is worth 25% or 50% of final grade, see Grading Policy.*

	Percent of term work grade:	*Tentative schedule:*
Quizzes*	100%	**on Monday Sep. 9, 23, Oct. 7, 21, Nov. 4, 18, 25, Dec. 9 unless announced otherwise**

Each quiz is equally weighted. * Each quiz is usually between 30 and 60 minutes in duration at the end of class. The students' quiz with the lowest grades do not count towards the final grade.

Important:

- There will be no make-up quizzes. If appropriate medical documentation is presented the weight of the quiz will be transferred proportionaly to the remaining evaluations of the semester.
- Students who will be absent for any predictable reason on a quiz day must inform the instructor in writing within the first two weeks of the semester of their intent to be absent so that alternative arrangements can be made. The written notice must be given even when the exact date is not known until later.
- Please note that I do **not** use Omnivox MIO, and messages sent to MIO are unfortunately ignored.

DAWSON COLLEGE

MATHEMATICS DEPARTMENT
Science Program
Science, Computer Science and Mathematics Program
Differential Calculus

201-SN2-RE

Course Objectives
This course provides an introduction to the study of Calculus, in particular single-variable Differential Calculus. Students will be introduced to the concepts of the limit, continuity, and the derivative and will learn how these concepts relate to tangent lines to curves and to rates of change. Students will learn how to compute derivatives using a variety of common rules and techniques. Students will apply the concept of the derivative in applications such as: curve-sketching, optimization, and the analysis of rates of change. An introduction to antiderivatives and indefinite integrals will prepare students for the transition to the study of Integral Calculus.

Course Competencies
For the student in the Science Program, this course contributes to the full achievement of the competency:

0M02: Analyze problems by applying differential calculus.

1. Determine the limit of a function.
2. Determine the derivative function.
3. Use the methods of differential calculus in mathematical applications.
4. Carry out the analysis of problems related to the natural sciences.

Pre-requisites
Secondary V Mathematics (TS or SN).

Ponderation
3-2-3 (3 hours of lecture, 2 hours of labs, and 3 hours of work outside class for each 5 hours of class time)

Evaluation
The Institutional Student Evaluation Policy (ISEP) is designed to promote equitable and effective evaluation of student learning and is therefore a 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. ISEP is available on the Dawson website. https://www.dawsoncollege.qc.ca/governance/institutional-student-evaluation-policy/

Evaluation Policy
The grading scheme will be the best of:

- Option 1:
  - 50% term work
  - 50% final examination
- Option 2:
  - 25% term work
  - 75% final examination

In order to pass the course, students must obtain a final grade of at least 60%, calculated according to the evaluation scheme above.

Required Text and Materials

Required text: *Single Variable Essential Calculus (Early Transcendentals), 2nd Edition* by James Stewart

References: *Calculus of a Single Variable (8th Edition)* by Larson, Hostetler & Edwards, *Calculus* by Edwards & Penney, or any standard text book on Calculus of a single variable.

Calculators: Students are only permitted to use the Sharp EL-531** calculator during tests and examinations.

Teaching Methods

Lectures and problem sessions.

Attendance & Course Participation Requirements

Attendance is recommended for the successful completion of the course.

For additional information regarding attendance, students should refer to the Institutional Student Evaluation Policy (ISEP section IV-C).

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.

Student Obligations

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).

1. Students have an obligation to arrive on time and remain in the classroom for the duration of scheduled classes and activities.
2. 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.
3. Students have an obligation to show respectful behavior and appropriate classroom deportment. 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.
4. Electronic/communication devices (including cell phones, 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.

Academic Integrity

Cheating in Examinations, Tests, and Quizzes: Cheating includes any dishonest or deceptive practice relative to formal final examinations, 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:

1. copying or attempting to copy another's work.
2. obtaining or attempting to obtain unauthorized assistance of any kind.
3. providing or attempting to provide unauthorized assistance of any kind.
4. using or possessing any unauthorized material or instruments which can be used as information storage and retrieval devices.
5. taking an examination, test, or quiz for someone else.
6. 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 Examination: Plagiarism is the presentation or submission by a student of another person's assignments or Comprehensive Examination 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 in 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 V-A.)

Intensive Course Conflicts & Policy on Religious Observance

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 observing religious holidays must inform each of their teachers, in writing, of the specific dates as soon as possible, but no later than the end of the second week of the impacted semester or term. Alternative arrangements convenient to both the student and the teacher must be made at the earliest opportunity. In the event that the date of a religious observance has yet to be determined, students must submit the name of the observance to their teachers and provide them with the specific date(s) as soon as it becomes available. This applies both to the semester or term, as well as to any final examination period. 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. (ISEP Section IV-D)

A form for this purpose is available here: https://www.dawsoncollege.qc.ca/mathematics/religious_observance_and_intensive_courses_form/

Additional Help

The Mathematics Department and the College offer several services for assisting students outside of the classroom. The up-to-date list of such services is available on the department website: https://www.dawsoncollege.qc.ca/mathematics/additional-help/

Course Content & Tentative Schedule

COURSE CONTENT & TENTATIVE[1] SCHEDULE

Textbook: Single Variable Essential Calculus - Early Transcendentals (2nd Edition), by James Stewart (ISBN-13 978-133-11278-5)

** = enriched or theoretical question*

PRE-CALCULUS REVIEW (7 HRS)		
ALGEBRA REVIEW HANDOUTS (PROVIDED BY TEACHER)		
CHAPTER 1 – FUNCTIONS AND LIMITS		
§ 1.1	FUNCTIONS AND THEIR REPRESENTATIONS	p.8 – 10 #2 – 10, 21 – 35, 39 – 42
§ 1.2	A CATALOG OF ESSENTIAL FUNCTIONS	p.21 – 24 #37 – 53
Note: Review topics may be covered separately at the beginning of the course or in conjunction with calculus concepts as they appear throughout the course.		
DETERMINE THE LIMIT OF A FUNCTION (13 HRS)		
CHAPTER 1 – FUNCTIONS AND LIMITS		
§ 1.3	THE LIMIT OF A FUNCTION	p.33 – 34 #3 – 14
§ 1.4	CALCULATING LIMITS	p.43 – 44 #1 – 7, 10 – 28, 31, 33 – 36, 37 – 42, 49 – 56
§ 1.5	CONTINUITY	p.54 – 55 #1 – 8, 11, 15 – 18, 29 – 31, 33 – 35*
§ 1.6	LIMITS INVOLVING INFINITY	p.67 – 68 #1 – 8, 10, 13 – 25, 26*, 27 – 30, 35, 36, 40, 41, 43
REVIEW	CHAPTER 1	p.70 – 72 #19 – 32, 33 – 36, 39, 40, 45
DETERMINE THE DERIVATIVE FUNCTION (20 HRS)		
CHAPTER 2 – DERIVATIVES (16 HRS)		
§ 2.1	DERIVATIVES AND RATES OF CHANGE	p.80 – 81 #1, 3, 5, 6, 8, 9*, 11 – 18, 19 – 23, 25 – 30, (31 – 36)*
§ 2.2	THE DERIVATIVE AS A FUNCTION	p.92 – 93 #1 – 11, 15, 19 – 27, 33 – 36, 47*
§ 2.3	BASIC DIFFERENTIATION FORMULAS	p.105 – 106 #1 – 35, 38 – 40, 43, 47 – 50, 53, 63*, 64*, 67*
§ 2.4	THE PRODUCT AND QUOTIENT RULES	p.112 – 113 #1 – 35, 37 – 42, 45, 46, 48*
§ 2.5	THE CHAIN RULE	p.120 – 121 #1 – 48, 52 – 56, 58 – 59, 61 – 63, 75*, 76*
§ 2.6	IMPLICIT DIFFERENTIATION	p. 127 – 128 #1 – 28
§ 2.7	RELATED RATES	p. 132 – 134 #1 – 33, 37 – 40
§ 2.8	LINEAR APPROXIMATIONS AND DIFFERENTIALS	p.138 #17 – 26
REVIEW	CHAPTER 2	p.140 – 143 #1, (3 – 9)*, 10 – 48, 51, 53 – 64
CHAPTER 3 - INVERSE FUNCTIONS: Exponential, Logarithmic and Inverse Trigonometric Functions (4 HRS)		
§ 3.1	EXPONENTIAL FUNCTIONS	p. 145 – 149 READ p.148-149 "*the number e*" EXERCISE p.150 #2, 15, 16, 23 – 30
§ 3.2	INVERSE FUNCTIONS AND LOGARITHMS	p.161 – 162 #43 – 57 (REVIEW) 71 – 76
§ 3.3	DERIVATIVES OF LOGARITHMIC AND EXPONENTIAL FUNCTIONS	p.169 – 170 #1 – 64, 68 – 71
§ 3.5	INVERSE TRIGONOMETRIC FUNCTION	p.183 – 184 #1 – 6, 16 – 28, 30 – 38
REVIEW	CHAPTER 3:	p.200 – 201 #17 – 26, 28 – 38, 40, 43, 49, 52, 53
USE DIFFERENTIAL CALCULUS IN MATHEMATICAL APPLICATIONS (20 HRS)		
§ 3.7	INDETERMINATE FORMS AND L'HOSPITAL'S RULE	p.197 #1 – 38, (53 -55)* (6 HRS)
REVIEW	CHAPTER 3: INVERSE FUNCTIONS	p.200 – 201 #61 – 64, 66 – 76
CHAPTER 4 - APPLICATIONS OF DIFFERENTIATION (14 HRS)		
§ 4.1	MAXIMUM AND MINIMUM VALUES	p.208 – 209 #1, 3 – 14, 23 – 32, 35, 36 – 44, 47 – 49
§ 4.2	MEAN VALUE THEOREM	#1 – 4, 7, 9 – 12, 15, 33*
§ 4.3	DERIVATIVES AND THE SHAPES OF GRAPHS	p.222 – 23 #1 – 4, 7 – 13, 15*, 16 – 19, 23, 24*, 25 – 31, 34
§ 4.4	CURVE SKETCHING	p.230 #1 – 26, 35 – 40
§ 4.5	OPTIMIZATION PROBLEMS	p.238 – 239 #1 – 28
REVIEW	CHAPTER 4:	p.254 – 255 #1 – 3, 5, 8, 9 – 10, 12 – 14, 15 – 20, 23, 24, 39, 40
USE DIFFERENTIAL CALCULUS TO SOLVE PROBLEMS RELATED TO SCIENCE (5 HRS)		
§ 4.7	ANTI-DERIVATIVES	p.252 #1 – 9, 12 – 13, 14*, 15 – 34, 35 – 36*
REVIEW	CHAPTER 4	p.238 – 239 #51 – 58
CHAPTER 5 – INTEGRALS		
§ 5.5	THE SUBSTITUTION RULE	p.306 #1 – 20, 22 – 36
REVIEW	CHAPTER 5	p.309 #19, 21 – 29, 31, 32

[1] *The number of hours attributed to each section is approximate.*