Saint Mary's University
Department of Mathematics and Computing Science

Course Information
MATH 1210.1 - Introductory Calculus I
Winter Term 2017

Note: Midterm is outside regular class time. Recitations start during the first week of classes (Sep 7-8).

Room and time: TR 8:30 - 9:45, LA 170 (Section A), AT 101 (Section B).

Instructors: Section A: Mitja Mastnak, MN 124, mmastnak@cs.smu.ca, (902)4205783.
Section B: Micah McCurdy, MN 119, micah.mccurdy@gmail.com.

Recitations Schedule:

A	F 10-11:15	LA 179	R. Moussi	MN 128	rania.moussi@smu.ca
B	F 10-11:15	LA 176	M. Mastnak	MN 124	mmastnak@cs.smu.ca
C	F 11:30-12:45	LA 275	R. Dawson	MN 105	rdawson@cs.smu.ca
D	F 11:30-12:45	LA 275	M. McCurdy	MN 119	micah.mccurdy@gmail.com
E	F 1-2:15	LA 275	Fatemeh Bayeh	MN 119	fatemehbayeh@uregina.ca
F	F 1-2:15	LA 177	M. McCurdy	MN 119	micah.mccurdy@gmail.com
G	R 2:30-3:45	LA 179	A. Fraser	MN 119	adele.fraser@smu.ca
H	R 2:30-3:45	LA 176	Fahimeh Bayeh	MN 119	fahimehbayeh@uregina.ca
I	R 6-7:15	LA 271	Fatemeh Bayeh	MN 119	fatemehbayeh@uregina.ca

Department Secretary: Rose Daurie, MN 114, rose.daurie@smu.ca.

Office hours: M. Mastnak: TWR 10–12.
M. McCurdy: F 9:30–11:30, 2:30–4:30.
subject to change, changes will be posted on the class website.

Website: *Brightspace* (accessed through SMU portal) and http://www.cs.smu.ca/math1210

Description: This is a first course in calculus, intended for science and engineering students. Core topics include: functions, limits, continuity, differentiability; derivatives of algebraic and transcendental functions, L'Hôpitals Rule, curve sketching; optimization problems; antiderivatives; area under curves; the fundamental theorem of calculus. (3 credit hours / 3 hours lecture plus 1.5 hours recitation per week)

Textbook: Calculus: Early Transcendentals (2nd ed) by Brigs, Cochran, Gillett.

Prerequisites: By September 13 all students registered in Math 1210 must have obtained either a satisfactory grade on the SMU Mathematics Placement Test or a passing grade in Math 1190. Students who have failed to meet these conditions yet remain registered in Math 1210 will be assigned an automatic grade of F. Detailed information regarding the Placement Test has been disseminated separately.

The course mark will be calculated as follows:
- **placement test:** Please see the section on prerequisites,
- **quizzes and worksheets: 15%** (during weekly recitations)
- **midterm: 30%** (Tuesday, October 24, 7–9pm),
- **final: 55%** (to be scheduled by the Registrar for sometime during the exam period Dec. 2–16),
- a grade of **at least** 30% **on the midterm** is required to pass the course,
- a grade of **at least** 40% **on the final** is required to pass the course,
- your instructor reserves the right to adjust the grading scheme upwards,
- please consult the 2017/18 Academic Calendar (p. 32) for the conversion scale to letter grades.

Final Exam: The date of the final examination is not yet determined, but it will occur within the official examination period (December 2–16). Do not make travel plans during this period until the date of the exam has been announced. The exam will cover the entirety of the course, with somewhat greater emphasis on post-midterm material.

Midterm: The midterm will be held on Tuesday, October 24, from 7–9pm in the Loyola Conference Hall. It will cover all material discussed in class up to (and including) October 17. Note that the midterm occurs outside of regular instructional hours. If valid reasons prohibit you from writing the test at the scheduled time then you will be offered reasonable accommodations. However, you must notify your instructor and provide him with proper documentation by October 10 at the latest. (See Academic Regulation 4c in the SMU 2017-2018 Academic Calendar, p.31.)

Recitations: Recitations will be held every week except during the week of November 6 (study break from Nov 10 to Nov 14). The nature of the recitations may vary from week to week, but you will generally be expected to complete a brief quiz (working on your own) followed by a longer worksheet (working in small groups with guidance from an instructor). The recitation quizzes and worksheets will be submitted for grading and will comprise 15% of your grade (10% for quizzes and 5% for worksheets). The content of the quizzes/worksheets will generally be based on the previous weeks suggested homework (see below). Some recitations may introduce material not covered in lectures. In the first recitation in the week of September 4, you will review some material (based on Chapter 1); some of this material will probably be new to you. In the second recitation in the week of September 11 you will write a quiz and a worksheet based on a review of Chapter 1 of the text with emphasis (but not limited to) on equations of lines in a plane. The chapter in question will not be covered in class, but students are responsible for ensuring they are familiar with its content.

Homework: Suggested homework problems will be posted to the course web-page on a weekly basis. Your work on these problems will not be collected or graded, nor will you be given official solutions. Nevertheless, the homework assignments are an instrumental part of the course and should be attempted by every student. Careful attention to these exercises will be the biggest driver of your success in the course. If you are having difficulties with the homework then you are strongly encouraged to take advantage of all available resources, such as one-on-one help during your instructor's office hours, peer tutoring at the SNAP centre, supplementary texts from the library, etc.

Absence: Except in very special cases (which must be appropriately documented), all assessments must be completed during their scheduled periods. Do not make travel or other arrangements which could potentially be in conflict. Moreover, all requests for special arrangements must be made prior to the relevant assessment. No accommodations will be granted for requests made after-the-fact. For logistical reasons there will be no allowance to "make up" missed recitation work. If you miss 2 or more recitations for valid reasons then the weighting of your other recitation work will be increased accordingly (note that in this case all your recitation marks will count, i.e., the lowest one will not be dropped).

Calculators: The use of calculators or other electronic aids (including phones, tablets, laptops, etc.) will not be permitted during any assessment period (midterm, exam, or recitation). Questions will be chosen so that such aids are not necessary. This ban on electronic devices is not arbitrary, nor does it stem from a desire to relive antiquity. We are well aware of the usefulness of calculators and computers. We even use them from time to time, and indeed encourage you to bring them to lecture. However, there are sound reasons to exclude them from our tests. Ask your instructor if you desire further explanation.

Academic Integrity: Copying work from another student is always prohibited and offenders will be subject to academic discipline. This applies to collaborative assignments as well as tests. (If you need to look at someone else's answer to write down your own, then you are very likely copying from them.) If you are found to be in possession of prohibited aids during an assessment period (test, exam, recitation) then you will be deemed to be cheating, regardless of whether you were caught using the device. All students should be familiar with the section of the SMU 2017-2018 Academic Calendar entitled Academic Integrity and Student Responsibility (pp.17–25).

Outcomes:

Limits: Students should know the formal definition of a limit, and be able to find limits informally in a graphical context. They should know the standard rules for operations on limits (including one-sided limits), be able to compute most limits of standard functions, and to recognize most situations where limits of standard functions fail to exist. They should be able to apply the *Squeeze Theorem* to find limits of standard functions that are algebraically intractable but bounded between simpler functions with a common limit. They should know the limit definition of the derivative and be able to use it to find the derivatives of most simple standard functions from first principles. They should be able to use "standard tricks" such as approximations for $\frac{\sin x}{x}$ and $\frac{1-\cos x}{x^2}$ and rationalizing the denominator for this purpose.

Differentiation: Students should know the derivatives of elementary functions and the standard rules for operations on derivatives (sum, product, quotient, chain) and be able to use this knowledge to differentiate all standard functions quickly, confidently, and accurately. They should get the signs of trigonometric derivatives correct without hesitation. They should be able to use logarithmic differentiation to simplify the differentiation of standard functions involving multiplication and exponentiation, recognize situations where it is appropriate, and use it with confidence. They should be able to use the chain rule to find derivatives of inverse functions. They should be able to use implicit differentiation to calculate $\frac{dy}{dx}$, where y is given implicitly by an equation of the form $f(x, y) = C$ and f is any standard function of two variables.

Applications of the Derivative Within Mathematics: Students should be able to use L'Hôpitals Rule to find the limits of standard functions at points where they are indeterminate of the form $0/0$, or indeterminate in other forms that can be converted into this form. They should be able to use first and second derivatives in conjunction with factorization, evaluation, and limits to sketch the graphs of moderately complicated standard functions. They should be able to use derivatives to approximate the values of elementary functions near familiar values (e.g., $\sin(29°)$, $\sqrt{3.99}$) and have some understanding of the size of the error.

Applications of the Derivative Outside Mathematics: Students should be able to solve related rates problems, recognizing situations where implicit differentiation is appropriate and using whatever differentiation techniques are appropriate confidently. They should be able to solve constrained optimization problems involving two simple standard functions of two variables, by the method of elimination of variables. (The method using implicit differentiation may be used instead.)

Integration: Students should be able to find antiderivatives by pattern matching, by the "guess-and-correct" method, and by explicit substitution. They should be able to do these quickly, confidently, and accurately. They should be aware that they cannot find the antiderivatives of all standard functions, and that this is not a limitation of their knowledge but a property of antidifferentiation. They should be aware that antiderivatives are only defined up to a constant, and should include this constant in the antiderivative when it is undetermined. They should be aware of the Fundamental Theorem of Calculus (which asserts that differentiation and integration are inverse operations in a certain precise sense). They should be able to apply the Fundamental Theorem, alone or in conjunction with the chain rule, to find derivatives of integrals with changing bounds. Students should be able to express the area under a curve as a limit of a Riemann sum or, equivalently, as a definite integral, and further be able to use antidifferentiation to evaluate such areas.