



University of Manitoba
 Faculty of Science
 Department of Mathematics

1 Course Details

Course Title & Number	MATH 1230: Differential Calculus
Number of Credit Hours	3
Class Times & Days of Week	MWF 12:30-1:20
Class Location	Buller 527 150 E2-EITC
Lab Times	Friday 9:30-10:20 and 1:30-2:20
Lab Locations	Allen 330 and Armes 115 respectively
Midterm:	November 1, Room 201 Armes, 5:30-7:30

2 Instructor Contact Information

Instructor(s) Name	Adam Clay
Course website:	http://server.math.umanitoba.ca/~claya/math1230_2016.html
Office Location	473 Machray Hall
Office Hours	Monday 3:30-4:30, Thursday 3:30-4:30 or by appointment if necessary.
Office Phone Number	204-474-6849
Email	adam.clay@umanitoba.ca Email is my preferred method of contact. When you email me with a question, please articulate the question carefully. If the question involves a lot of mathematical symbols, feel free to write it down and take a picture of the equations needed to explain your question.

3 Required material

The textbook is *Calculus: a complete course* by R. A. Adams and C. Essex, 8th ed., from Pearson publishing. It is available at the University of Manitoba bookstore. The textbook is required. No other materials (e.g. online resources) are required for this course, though some may find it helpful in their studies.

4 Course Outline

This course will be different than MATH 1500: it will cover roughly the same material, but key ideas will be investigated more deeply than in MATH 1500. It is a rigorous (i.e. a formal and more difficult) introduction to the fundamental ideas of differential calculus, such as limits, continuity, and differentiation, including proofs. The course will also cover word problems,

(optimization and related rates), evaluating limits of indeterminate type, curve sketching and Taylor polynomials.

This course is intended not only to teach the fundamentals of differential calculus (and applications), but to teach careful mathematical thinking. Careful mathematical thinking also requires skillful communication of technical mathematical ideas, so students will be required to read, understand and write proofs involving $\epsilon - \delta$ reasoning (as well as other fundamental concepts in calculus).

Here is an approximate timeline for the topics to be covered in this course:

Week of	Sections and topics	Comments
Sept 9		First class
Sept 12	P1, P4, P5: Real numbers, intervals and absolute value notation, transformations of graphs, inequalities, introduction to mathematical proof.	Read P2, P3, P6 independently.
Sept 19	P7, 1.2, 1.3: Trig functions, introduction to limits (imprecise definition), infinite limits.	
Sept 26	1.3, 1.4, 1.5: More study of limits and their precise definition.	Assignment 1 due Sept 26th.
Oct 3	1.5, 9.1: Precise definition of a limit, convergence of sequences, relationship with continuity.	Fall break, no class Oct 7.
Oct 10	2.1, 2.2: Tangent lines and derivatives.	Thanksgiving: No class Oct 10. Assignment 2 due Oct 12.
Oct 17	2.2, 2.3, 2.4: Derivatives and differentiation rules.	
Oct 24	2.5, 2.6, 2.8: Differentiating trig functions, higher-order derivatives and the mean value theorem.	Assignment 3 due Oct 24.
Oct 31	2.9, 2.10, 2.11: Implicit differentiation, antiderivatives and initial value problems, velocity and acceleration.	Midterm this week.
Nov 7	3.1, 3.2, 3.3: Inverse functions, logarithms, exponentials and their derivatives.	Assignment 4 due Nov 7.
Nov 14	3.5, 2.6, 4.1: Inverse trig functions, hyperbolic functions, start related rates.	
Nov 21	4.3, 4.4, 4.5: L'Hopital's rule, extreme values and concavity.	Assignment 5 due Nov 21.
Nov 28	4.6, 4.8, 4.9: Curve sketching, extreme value problems, linear approximation.	

Dec 5 4.10: Taylor polynomials, using Taylor polynomials to evaluate limits. Review.

5 Attendance Policy

Students are expected to attend class and the mandatory labs, but attendance will not be taken.

6 Course Evaluation Methods

Item	Due Date	Value of Final Grade
Assignments	Due at the beginning of classes according the schedule in Section 4. There will be five assignments, only your best four will be counted.	20%
Midterm test	Week of October 31	30%
Final exam	Date to be determined	50%

7 Grading

Grading in this course will be rather strict. Submitted work and exams will be marked not only for mathematical correctness, but for clarity of presentation (e.g. work that is messy, illegible or contains logical gaps cannot receive full marks even if you reach the correct answer).

Numbers will be converted to letter grades according to the following rules. Note that these cutoffs may be adjusted downwards, e.g. A+ may be awarded to grades above 90, A may be given to grades above 80, etc.

Letter Grade	Minimum percentage to guarantee	Final Grade Point
A+	95	4.5
A	85	4.0
B+	80	3.5
B	72	3.0
C+	65	2.5
C	60	2.0
D	50	1.0

8 Assignment Grading Times

Assignments will be returned in the labs, two Fridays after they were collected. The midterm test will be graded and returned within two weeks (so that you have access to the test before the VW date). Solutions to the test will also be available. There will be no solutions available for the

assignments, but you are encouraged to ask your TAs in the labs if you cannot understand how to solve an assignment problem after receiving your graded paper.

9 Schedule of tests and quizzes and assignments

There will be five assignments and one test. The assignments are due as indicated in the timetable in Section 4, at the **beginning** of the classes indicated. You will have two weeks to complete each one. Assignments will be posted on the course website. The test will be held on the week of October 31st. **(Added October 3: The midterm test will be on Tuesday, November 1 in room 201 Armes from 5:30 until 7:30).**

10 Policy on missed or late assignments, quizzes, tests

Late assignments will not be accepted under any circumstance and will receive a grade of zero. An assignment is late if it is not turned in at the **beginning** of the designated class, when the TA will come to pick them up. Since only your four best assignments will be considered when calculating your final grade, you can receive a grade of zero on one assignment and it will not impact your final grade.

If you miss the midterm exam, you have three days to contact me and report the reason for your absence. You must provide me with documentation that excuses your absence (e.g. a doctor's note) as soon as possible. Your final exam will then be weighted at 80%.

11 Course Technology

It is the general University of Manitoba policy that all technology resources are to be used in a responsible, efficient, ethical and legal manner. The student can use all technology in classroom setting only for educational purposes approved by instructor and/or the University of Manitoba Student Accessibility Services. Student should not participate in personal direct electronic messaging / posting activities (e-mail, texting, video or voice chat, wikis, blogs, social networking (e.g. Facebook)) online and offline "gaming" during scheduled class time. If student is on call (emergency) the student should switch his/her cell phone on vibrate mode and leave the classroom before using it. (© S Kondrashov. Used with permission)

The primary online resource for this course will be the course website:

http://server.math.umanitoba.ca/~claya/math1230_2016.html

12 Recording Class Lectures

Adam Clay and the University of Manitoba hold copyright over the course materials, presentations and lectures which form part of this course. No audio or video recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without permission. Course materials (both paper and digital) are for the participant's private study and research.

13 Student Accessibility Services

If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation.

Student Accessibility Services <http://umanitoba.ca/student/saa/accessibility/>
520 University Centre
204 474 7423
Student.accessibility@umanitoba.ca

14 Academic Integrity

In addition to the general information about academic integrity and student discipline that you provide (Schedule “A” Policies and Resources), references to specific course requirements for individual work and group work, such as:

- (i) Group projects are subject to the rules of academic dishonesty;
- (ii) Group members must ensure that a group project adheres to the principles of academic integrity.
- (iii) Students should also be made aware of any specific instructions concerning study groups and individual assignments;
- (iv) The limits of collaboration on assignments should be defined as explicitly as possible; and
- (v) All work is to be completed independently unless otherwise specified.

Make clear your expectations as it pertains to academic integrity within the context of your course and refer specifically to the course requirements.