

**MATH 100A: Calculus I**

3 Credits, 3 hours lecture, 2 hour lab

4.0 Engineering units for the University of Alberta

This course covers rectangular and polar coordinates, analytic geometry, transcendental functions, limits, continuity, derivatives and applications, Taylor polynomials, integration and applications.

*Prerequisites: MATH 30-1 and MATH 31 (or equivalent)*

*NOTE: This course may not be taken for credit if credit has already been obtained in MATH 1113, or University of Alberta's MATH 114 or MATH 117. MATH 100 is restricted to Engineering students.*

**Instructor**

Instructor Name: Matthew Morin

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**Office Hours**

Monday 10:00 – 10:50

Tuesday 10:00 – 10:50

Wednesday 09:00 – 10:50

Friday 10:00 – 10:50

**Hours of Instruction**

Monday 09:00 – 09:50 (S205)

Wednesday 11:00 – 11:50 (S205)

Thursday 09:00 – 10:50 (S105)

Friday 09:00 – 09:50 (S205)

**Required Resources**

**Calculus, Early Transcendentals**, James Stewart, 8<sup>th</sup> edition.

Subscription to WebAssign (<http://webassign.net>) is required for the completion of the online homework. At the Keyano bookstore the above textbook comes packaged with a paid subscription.

**Course Outcomes**

Upon successful completion of this course, the student shall be able to:

- Setup and evaluate limit problems
- Apply the derivative rules to differentiate complex combinations of these functions.
- Apply derivatives to solve problems involving rates of change.
- Given a formula for a function, determine the intervals where it is
  - Increasing or decreasing
  - Concave upward or concave downward

- and determine the function's
  - Maximum and minimum values
  - Points of inflection.
- Create a reasonable sketch of the function given information about its derivatives.
- Apply knowledge of derivatives to find the optimal solution to a variety of word problems.
- Explain the difference between the definite and indefinite integral.
- Use integrals to solve area problems, initial value problems, and net-change problems.
- Recognize and employ the substitution method to evaluate more complex integrals.
- Demonstrate an ability to communicate a solution using the language and theory of calculus.

**Evaluation**

Assignments	15% (5% Webassign, 5% Homework Sets, 5% Lab Assignments)
Quizzes	15%
Midterm Exam	25%
Final Exam	45%
Total	100%

*A grade of C- is required for progression or transfer.*

**Assignments:**

In any mathematics course the best way “to learn” is “to do.” The instructor can teach you about the course ideas and demonstrate the mechanics of solving the problems—and can make it look very easy—but growing adept at solving these problems will take a lot of practice and can be a struggle. Although the assignments do not count for a large part of your final grade they are essential in preparing you for the types of problems you will be solving on the exams.

The assignments should be typed or written neatly, stapled, and handed in on the assigned due date. A cover page is not required, but the assignment should show the assignment number, the course number, and the student's name (printed, not written). The problems should be solved in the order given. A late assignment may be accepted, or may incur a penalty.

Although you may work with other students while completing assignments, it is essential that the work you present is your own—see the section on academic misconduct below. Using other students solutions as your own may result in serious academic penalties. If you work with other students on assignment problems, be sure that you know how to solve the problems and that you write out your own solutions in your own words.

**Tests:**

All tests will be written and are closed-book. No calculators are allowed, nor should they be needed. The topics covered by each test will be described in advance in-class and these details will be posted on Moodle. These tests are meant to test how well you have “mastered” the subject matter. Satisfactory completion of the relevant assignment problems, reading the relevant textbook sections, and studying the course notes is the very minimum amount of work that should prepare you for the types of problems that could appear on a test. However, as tests are cumulative, you may be solving problems that require ideas that bridge across several sections of the course.

**Grading System**

Descriptor	Alpha Grade	4.0 Scale	Percent	Rubric for Letter Grades
Excellent	A+	4.0	> 92.9	Work shows in-depth and critical analysis, well developed ideas, creativity, excellent writing, clarity and proper format.
	A	4.0	85 – 92.9	
	A-	3.7	80 – 84.9	
Good	B+	3.3	77 – 79.9	Work is generally of high quality, well developed, well written, has clarity, and uses proper format.
	B	3.0	74 – 76.9	
	B-	2.7	70 – 73.9	
Satisfactory <b>Progression</b>	C+	2.3	67 – 69.9	Work has some developed ideas but needs more attention to clarity, style and formatting.
	C	2.0	64 – 66.9	
	C-	1.7	60 – 63.9	
Poor <b>Minimum Pass</b>	D+	1.3	55 – 59.9	Work is completed in a general way with minimal support, or is poorly written or did not use proper format.
	D	1.0	50 – 54.9	
Failure	F	0.0	< 50	Responses fail to demonstrate appropriate understanding or are fundamentally incomplete.

**Proposed Schedule of Topics**

Week	Dates	Topic	Chapter Sections
1	Sept. 4 - Sept. 8 <b>(No classes Sept. 4,5)</b>	Introduction, Introduction to Limits	Introduction, 2.2
2	Sept. 11 - Sept. 15	Limit Laws, Continuity	2.3, 2.5
3	Sept. 18 - Sept. 22	Limits at Infinity, Limit Definition of the Derivative	2.6, 2.1, 2.7
4	Sept. 25 - Sept. 29	The Derivative as a Function, Derivative Rules of Basic Functions	2.8, 3.1, 3.3, 3.6
5	Oct. 2 - Oct. 6	Product and Quotient Rule, Chain Rule, Implicit Differentiation	3.2, 3.4, 3.5
6	Oct. 9 - Oct. 13 <b>(No classes Oct. 9<sup>th</sup>)</b>	Logarithmic Differentiation, Hyperbolic Functions, Applications of Rates of Change	3.6 (cont.) 3.11, 3.7
7	Oct. 16 - Oct. 20	Related Rates, <b>Midterm Exam</b>	3.9
	Oct. 23 - Oct. 27	Antiderivatives, Areas, Definite Integral	4.9, 5.1, 5.2
8	Oct. 30 - Nov. 3	Indefinite Integrals, Fundamental Theorem of Calculus	5.2 (cont.), 5.3, 5.4
9	Nov. 6 – Nov. 10 <b>(No classes Nov. 9, 10)</b>	Substitution Method, L'Hopitals Rule	5.5, 4.4
10	Nov. 13 – Nov. 17 <b>(No classes Nov. 13<sup>th</sup>)</b>	Mean Value Theorem, Mimimum and Maximum Values	4.2, 4.1
11	Nov. 20 – Nov. 24	How Derivatives Affect the Shape of a Curve	4.1 (cont.) , 4.3
12	Nov. 27 – Dec. 1	Curve Sketching, Optimization	4.5, 4.7
13	Dec. 4 – Dec. 8 <b>(No classes Dec. 8<sup>th</sup>)</b>	Newton's Method, Linear Approximation	4.8, 3.10
14	Dec. 11– Dec. 15	<b>Exam Period</b>	

**Please Note:**

Date and time allotted to each topic is subject to change.

## Performance Requirements

### Student Responsibilities

It is your responsibility as a student to contact the Office of the Registrar to complete the forms for Withdrawal or Change of Registration, and any other forms. Please refer to the list of important dates as noted in the Academic Schedule in the Keyano College credit calendar.

More specific details are found in the Student Rights and Student Code of Conduct section of the Keyano College credit calendar. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Student Code of Conduct Policies.

### Laboratory Safety

In the science laboratories, safety is important.

Students must complete the *WHMIS for Students* online training course on Moodle before entering the science laboratories.

Students must comply with the mandatory laboratory safety rules for this course as provided in the laboratory manual. Failure to do so will result in progressive discipline such as a verbal warning, refused entry into the laboratory, or suspension from the College.

### Student Attendance

Class attendance is useful for two reasons. First, class attendance maximizes a students' learning experience. Second, attending class is a good way to keep informed of matters relating to the administration of the course (e.g., the timing of assignments and exams). Ultimately, you are responsible for your own learning and performance in this course.

It is the responsibility of each student to be prepared for all classes. Students who miss classes are responsible for the material covered in those classes and for ensuring that they are prepared for the next class, including the completion of any assignments and / or notes that may be due.

### Academic Misconduct

Students are considered to be responsible adults and should adhere to principles of intellectual integrity. Intellectual dishonesty may take many forms, such as:

- Plagiarism or the submission of another person's work as one's own
- The use of unauthorized aids in assignments or examinations (cheating)
- Collusion or the unauthorized collaboration with others in preparing work
- The deliberate misrepresentation of qualifications
- The willful distortion of results or data
- Substitution in an examination by another person
- Handing in the same unchanged work as submitted for another assignment
- Breach of confidentiality.

The consequences for academic misconduct range from a verbal reprimand to expulsion from the College. More specific descriptions and details are found in the Student Rights and Student Code of Conduct section of the Keyano College credit calendar. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Student Code of Conduct Policies.

In order to ensure your understanding of the concept of plagiarism, you must successfully complete the online tutorial found on [ilearn.keyano.ca](http://ilearn.keyano.ca). Then print the certificate, sign it, and show it to each of your instructors. Your course work will not be graded until you show this signed certificate.

**Specialized Supports****Counselling and Accessibility Services**

Counselling Services provides a wide range of specialized counselling services to prospective and registered students, including personal, career and academic counselling.

**SKILL Centre**

The SKILL Centre is a learning space in the Clearwater Campus at Keyano College where students can gather to share ideas, collaborate on projects and get new perspectives on learning from our tutorial staff.

The SKILL Centre, through a variety of delivery methods, provides assistance in skill development to Keyano students. Assistance is provided by instructors, staff and student tutors. Individuals wishing to improve their mathematics, writing, grammar, study, or other skills, can take advantage of this unique service.

**Authorization**

This course outline has been reviewed and approved by the Program Chair.



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Matthew Morin, Instructor

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Louis Dingley, Chair

Date Authorized

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Vincella Thompson, Dean

Date Authorized

**Signed copies to be delivered to:**

Instructor

Registrar's Office