

# Elements of Calculus

## Math 180

Mychael Smith

Academics 111  
(505) 925-8644  
mysmith@unm.edu

Office Hours  
STEM: M 10-11; LRC: 10-11;  
Online: TR 11-12:45; In office:  
MW 10-11:45 and TR 11-12:45  
and by appointment

## 1 Overview

Welcome to Math 180. Here is the UNM course description.

Limits of functions and continuity, intuitive concepts and basic properties; derivative as rate of change, basic differentiation techniques; application of differential calculus to graphing and minima-maxima problems; exponential and logarithmic functions with applications. Credit not allowed for both MATH 162 and MATH 180. Prerequisites/placement: Successful completion of Math 121 or MATH 150 or minimum AC-CUPLACER score of 69-99 (College-Level Math), or math ACT score of 26, or math SAT score of 600. Meets UNMCC – Area 2: Mathematics; meets NMCC – Area II: Mathematics.

In this course, we are going to be covering various topics in and applications of calculus. Calculus involves studying functions and their various properties. We will study many applications of calculus, including rate of change and optimization problems.

## 2 Course Learning Outcomes

- Course Goal #1: Communication Student Learning Outcomes (SLOs)
  - SLO 1: Students will use correct mathematical notation and terminology
  - SLO 2: Students will be able to generate, read, and interpret graphs of functions
  - SLO 3: Students will be able to use functions that model real-world situations such as the profit of a business, the design of a box, and the height of a thrown ball.
  - SLO 4: Students will use the various notations for the derivative.
- Course Goal #2: The Derivative Addresses UNM core area 2/ HED area II: Mathematics (Calculus)
  - SLO 1: Student will be able to determine the slope of a straight line from a graph and from any of the forms of the equation, and interpret it as a rate of change.

- SLO 2: Students will understand the slope of a curve at a point as the slope of the tangent line to the graph at that point, and will be able to determine the slope from a graphic representation and also analytically. They will be able to write the equation of the tangent line to a curve at a given point.
  - SLO3: Student will be able to determine when the limit of a function exists and when it doesn't, and to find limits algebraically and also from the graph of a function.
  - SLO 4: Students will be able to determine derivatives of simple functions using the limit definition, and will be able to apply the different rules of differentiation (power, product, quotient, chain)
  - SLO 5: Students will be able to use the graph of a function to explain why a function is or is not continuous or differentiable at a point.
- Course Goal #3: Applications of the Derivative Addresses UNM core area 2/ HED area II: Mathematics (Calculus)
    - SLO 1: Students will be able to describe the graph of a function as increasing or decreasing, concave up or concave down and relate these descriptions to the first and second derivatives.
    - SLO 2: Students will be able to use the first and second derivative to find relative maxima, relative minima, and inflection points.
    - SLO 3: Students will be able to sketch the graph of a function using numbers 1 and 2 above.
    - SLO 4: Students will be able to solve optimization problems using the concept of derivative.
    - SLO5: Students will be able to analyze and solve real-world problems involving exponential growth and decay.
  - Course Goal #4: Integrals Addresses UNM core area 2/ HED area II: Mathematics (Calculus)
    - SLO 1: Students will be able to find anti-derivatives of various types of functions.
    - SLO 2: Students will be able to use the Fundamental Theorem of Calculus and the rules of integration to evaluate definite integrals of simple functions.
    - SLO 3: Students will be able to find areas under curves, and use the definite integral to solve applied problems

### 3 Required Text

The required text for this course is:

- Calculus with Applications, 10th ed, Pearson.

You will also need a mymathlab code to register for online homework. The course id is **smith13287**.

## 4 Attendance Policy

Attendance in the course is required. I will use our reading questions to keep track of attendance. See more about the reading questions in the next section. If a student misses two classes in the first two weeks of the semester, three consecutive class periods or five total, I reserve the right (but not the obligation) to drop the student from the class.

## 5 Course Structure

In this class, I'm going to ask you to read. Every day of class, you will turn in to me reading questions for the following class discussion, warm-up exercises for the current day's discussion, and final homework problems for the previous day's discussion. To accomplish this, I will break each topic into three parts. Here are the details.

1. (Part A) Reading Questions: These reading questions will be used to see how much you've read. I may ask you to tell me anything you've found particularly interesting or tell me which definitions or examples you've had trouble understanding. I may invite you to ask me any questions you have about the reading. I will often use these reading questions as a guide for the following class discussion. It is important that you do these questions, so I get a good idea where to direct the next class's discussion.
2. (Part B) Warm-up Questions: Every day of class, I will also give you a short number of homework problems for you to work on *before* we have our class discussion on the topics. During the next class, we will discuss in groups the homework problems, learn together, and prepare you for a final homework assignment, either on paper or mymathlab.
3. (Part C) Final Homework Assignment: After our class discussion, you will go home and complete your final homework assignment.

It is *vital* that students do all of the assignments, because *I will not stand at the front of the class and lecture at you!* In this class, I will teach you the material, but our class is designed for us to learn together and give you the tools you need to further your education.

In summary, after each class, you will have three tasks.

1. Final homework for the most recent class.
2. Exercises for the next class.
3. Reading assignment for the class after that.

Finally, at the end of each Chapter we cover in the book, I will assign a quiz on that chapter in MyMathLab (MML).

## 6 Grading Policy

Your grades will be based on the reading questions, warm up exercises, homeworks, midterm and final. I will calculate your grade as follows.

<b>Requirement</b>	<b>% of Grade</b>
1. Reading Questions	5%
2. Attendance	5%
3. Warm-up Exercises	15%
4. Final Homeworks	25%
5. MML Quizzes	10%
6. Midterm	10%
6. Final Exam	30%

*You must receive at least 70% on the final exam to get credit for the class.*

## **7 Make-up Policy**

I will allow up to four late submissions of final homework assignments or MML quizzes for any reason. To make up one of these assignments, you must let me know by email and I will allow you to make up the assignment for full credit. Once the four assignment limit has been reached, I will not allow any further make-ups.

Because of the nature of the reading questions and warm-up exercises, I will not allow make-ups for these assignments.

## **8 A note on academic integrity**

We will follow university policy and on academic integrity.

Having academic integrity is paramount to your success in any class. Plagiarism or cheating is not tolerated. Any instance of this will result in a grade of zero for that assignment. Here is the link to the UNM Academic Dishonesty Policy: <https://policy.unm.edu/regents-policies/section-4/4-8.html>. The policy states:

Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, up to and including dismissal, against any student who is found guilty of academic dishonesty or who otherwise fails to meet the expected standards. Any student judged to have engaged in academic dishonesty in course work may receive a reduced or failing grade for the work in question and/or for the course.

Academic Dishonesty is defined as: "Academic dishonesty" includes, but is not limited to, dishonesty in quizzes, tests, or assignments; claiming credit for work not done or done by others; hindering the academic work of other students; misrepresenting academic or professional qualifications within or without the University; and nondisclosure or misrepresentation in filling out applications or other University records.

## **9 Students with Disabilities**

If you have a documented disability, please provide me with a copy of your letter from Equal Access Services as soon as possible to ensure that accommodations are provided in a timely manner.

## **10 EQUAL OPPORTUNITY AND NON-DISCRIMINATION:**

In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered “responsible employees” by the Department of Education (see page 15 - <http://www2.ed.gov/about/offices/list/ocr/docs/qa-201404-title-ix.pdf>). This designation requires that any report of gender discrimination which includes sexual harassment, sexual misconduct and sexual violence made to a faculty member, TA, or GA must be reported to the Title IX Coordinator at the Office of Equal Opportunity ([oeo.unm.edu](http://oeo.unm.edu)). For more information on the campus policy regarding sexual misconduct, see: <https://policy.unm.edu/university-policies/2000/2740.html>.

Note: This syllabus is subject to change, if needed.