

Math 251—Spring 2025—CRN 33066

Course Information

Instructor	Robert Lipshitz
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Office	Fenton 303
Office Hours	In person: TBD. Zoom: TBD. Time and format subject to change.

Course Prerequisites	Math 112Z (with a C- or better) or satisfactory placement exam score.
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Course Requirements	There will be WeBWorKs (online) homework due roughly once a week, weekly quizzes, two midterm exams, and a final exam. There will be optional written homework each week, from which quiz problems are adapted. There <i>will</i> be new material covered and homework assignments due during the last week of classes.
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Test Dates	<i>Midterm 1</i> : October 23. Subject to change if necessary. <i>Midterm 2</i> : November 13. Subject to change if necessary. <i>Final exam</i> : per Registrar's schedule. See below for policy regarding missed exams.
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Grading Policy	Online Homework	20%
	Quizzes	15%
	Midterm 1	17%
	Midterm 2	18%
	Final Exam	30%

The lowest two online homework scores and lowest two quiz scores will be dropped, as a uniform way of handling illnesses, family crises, and other events that might interfere with the course.

Students with disabilities	The University of Oregon is committed to an inclusive learning environment. If you have a disability which may impact your performance on exams, please contact the Accessible Education Center to discuss appropriate accommodations. If there are other disability-related barriers to your participation in the course, please either discuss them with me directly or consult with the Accessible Education Center.
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Course Policies

- Cell phones are not permitted in this class except by instructor's permission. Other electronic devices (computers, tablets, etc.) may be used *only for taking notes*. (They don't bother me, but there is strong evidence they distract other students.)
- You should read the sections in the textbook once *before* they are covered in class, and then again after they are covered in class.
- Using electronics, notes, or the textbook on quizzes or exams is not permitted. Getting help from anyone other than the instructor on a quiz or exam is also cheating. Any instance of cheating will result in a zero on the assignment and being reported to the university, with a recommendation of failing the class.
- Posting any course materials to Chegg or other online sites is a violation of policies, and will be reported to the university for disciplinary action.

Missed Exams

- If you have a conflict with a midterm exam and you alert me at least 10 days in advance, you will have the opportunity to take a version the exam a few days early, without penalty. In particular, this is the mechanism for accommodating cases 3 and 4 in the UO Attendance and Engagement policy.
- If you miss one midterm exam, I will compute your midterm exam score by taking a weighted average of your score on the other midterm exam and the final (after normalizing using the class means and standard deviations).
- If you miss both midterm exams, you will have the opportunity to take a makeup midterm 2 within two weeks of midterm 2, at a 15% linear penalty. That is, whatever score you get on the makeup exam will be multiplied by 0.85. If you do not take the exam within two weeks, your midterm exam score will be computed as zero.
- If you miss the final exam and are otherwise passing the class, you will receive an incomplete in the class and have the option to take a makeup exam in the first two weeks of the winter quarter, with a 5% linear penalty. If you do not take the exam in that time, I will compute your grade as if you received a zero on the final exam.
- If you miss the final exam but were otherwise failing the class, you will not have an opportunity to re-take the exam, and will receive and F in the class.

Course Resources

- Textbook: *OpenSTAX Calculus Volume I*, by various authors. Available online (linked from the course webpage).
- We will use Canvas to track grades and post some solutions.
- There is also a non-Canvas course website, with up-to-date schedule and assignments:

<http://pages.uoregon.edu/lipshitz/Teaching/Sp25Ma251.html>



Getting Help. I have office hours every week. Help is also available from peer tutors in the Math Library. Get help as soon as you feel confused. See the course webpage for additional advice.

Course goals. The main goals of this course (learning outcomes) are:

- Understanding the intuition behind limits and continuity and being able to compute limits and test for continuity in simple situations.
- Understanding the meaning of the derivative and being able to compute the derivatives of elementary functions. ("Elementary functions" is a technical term.)
- Be able to relate features of graphs to first and second derivatives.
- Be able to use derivatives to solve optimization, related rates, and other modelling problems.

General university policies

General university policies, discussing academic disruptions, COVID, reporting observations, and so on, are here:

<https://provost.uoregon.edu/syllabus-guidelines>

Detailed list of learning objectives

- (1) Evaluate limits using the algebraic limit laws.
- (2) Identify limits at $\pm\infty$ for rational functions.
- (3) Identify limits of rational functions involving cancellation of linear factors from numerator and denominator.
- (4) Compute left and right limits for a function (or decide they do not exist), given an expression for the function.
- (5) Identify the points where common functions are continuous and/or differentiable, and the same for functions given graphically.
- (6) Use the Intermediate Value Theorem to prove that roots of a function exist in a given closed interval.
- (7) Identify limits, as well as left and right limits, for functions given graphically, and identify points of discontinuity and types of discontinuity from formulas and graphs.
- (8) State and use the product rule, quotient rule, chain rule, and linearity rules for derivatives.
- (9) Recognize and use some standard trig identities, for example to calculate the derivative of $\sin(x)$, given that $\lim_{x \rightarrow 0} \sin(x)/x = 1$.
- (10) State the definition of the derivative in terms of a limit of difference quotients.
- (11) Interpret, including units, the derivative as an instantaneous rate of change of a quantity defined in an applied context.
- (12) Recognize the derivative as the slope of the tangent line.
- (13) State the Mean Value Theorem and interpret it in examples (e.g., word problems).
- (14) Use calculus to approximate the value of a function near a point p , given information about the function and/or its derivatives at p .
- (15) Compute derivatives of functions involving polynomials, exponential functions, logarithms, and trigonometric functions, using a combination of theorems, differentiation rules, and definitions.
- (16) Find the equation for the tangent line of a curve at a given point.

- (17) Calculate derivatives via implicit differentiation.
- (18) Use the methods of calculus to find asymptotes, local minima/maxima, intervals of concavity, intervals where the function is increasing/decreasing, and inflection points. Relate these properties to the graph of the function.
- (19) Find extrema of a function on open and closed intervals.
- (20) Solve optimization problems, including word problems.
- (21) Solve related rates problems, including word problems.
- (22) Use L'Hôpital's rule to evaluate indeterminate forms of limits, including cases requiring multiple applications.
- (23) Understand growth rates and, in particular, exponential growth.
- (24) Apply Newton's Method to find roots.
- (25) Find antiderivatives by guessing-and-checking, in simple cases.

(You could use this list as a checklist during the quarter or when reviewing for the final exam, for instance. Keep in mind that one key goal is understanding, though, not just a checklist of skills.)

Grading standards

Grades will be assigned consistent with the following standards:

- A: Demonstrated comprehensive mastery of the course material.
- B: Demonstrated a solid command of all of the key concepts and techniques in the course.
- C: A solid command of many key concepts of the class, but with some serious gaps.
- D: Did not demonstrate understanding of substantial parts of the course.
- F: Did not demonstrate understanding of even more substantial parts of the course, or participated in some kind of academic dishonesty.

Pluses and minuses indicate a slightly stronger or weaker demonstrated command of the material. Note that grades are assigned on the basis of accomplishment, not effort.

A combined score of 90% or more will guarantee you receive *at least* an A-, a combined score of 80% or more will guarantee you receive at least a B-, and a combined score of 70% or more will guarantee you receive at least a C-; but the cutoffs may be more generous than this.