MATH 251: Calculus I
SYLLABUS

Course Description: Standard sequence for students of physical and social sciences and of mathematics. Differential calculus and applications. Sequences. Students cannot receive credit for more than one of MATH 241, 246, 251.

Teaching Staff:

> **Instructor:** Dr. Laura Fredrickson
> E-mail: lfredric@uoregon.edu
> Webpage: web.stanford.edu/∼ljfred4/
> Office Hours: W 4:30-5:30, Th 4:30-5:30 via Zoom (see Canvas for meeting code)

Lecture: M, Tu, W, Th 3:30-4:20pm (Pacific Time)—Virtual (see Canvas for Zoom meeting info)

(Because of the COVID-19 academic disruption, Fall 2020 classes have been scheduled in either 60-minute or 90-minute blocks rather than in the standard blocks. The Math Department policy is to use the extra 10 minutes to provide breaks in order to make the Zoom meetings more bearable for students, and in this course we will be meeting 3:30-4:20pm.)

CRN: #14143

Prerequisites: C- or better in Math 112, or satisfactory placement exam score.

Course website: Course announcements, homework, solutions will be posted on Canvas.

Learning Outcomes: A successful student in this course should be able to model and solve a wide class of optimization problems that are accessible to differential calculus. Much of the other material covered in this course is necessary for that objective, so subgoals include:

- Learning how to differentiate, as this is necessary if you wish to use calculus to solve optimization problems.

- Learning how to sketch graphs of functions, as this is necessary to help identify where to search for local or global extrema when trying to optimize.

- Understanding some basic facts about limits, to both aid in sketching graphs of functions exhibiting asymptotic or discontinuous behavior and to give a geometric interpretation of the derivative as the slope of the tangent line of a graph.

- Solving related rates problem, as a warm up to the more difficult modelling used in optimization problems.

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Textbook: (Required) *Calculus, Concepts and Contexts, *4th edition* by James Stewart. (We will cover most of Chapters 2-4.)

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*Almost any edition will do for this class. If you are planning on taking Math 252, probably you should get the latest edition. And if you have a copy of Stewart's *Early Transcendentals* any volume after 5 that is okay too. Sometimes cheaper copies of earlier editions can be found on the web.

Additional Materials:
- You will need a green, red, and yellow object for in-class polling.
- You will need a webcam* so I can see your face during lecture.
- You will *not* need a printer.

Let me know if any of these will be a problem for you. (See here.)

What to Expect in this Remote Class: This will be an interactive class. I'll be using the "breakout rooms" feature in Canvas where you can discuss a question with 2-4 of your classmates. You'll be able to see both my face and the notes, and I ask that you turn on your video as well. (Your facial expressions are an important source of feedback for me as I'm lecturing, and I need them! It helps me know when to slow down or clarify something.) I'll also be doing some visual polling. For this, *you will need a solid green, yellow, and red piece of paper.* Have these nearby for every lecture, and raise one of them to respond when prompted. I'll use these for multiple choice questions, and for qualitative questions like "How are you all doing with this new material?" If it makes sense raise green, if you're confused raise red, and if you're somewhere in the middle raise yellow. Your responses are another essential form of feedback for me. You'll also collaboratively edit Google Slides. (See further advice here.)

The lectures will be recorded and posted to Canvas; a PDF copy of the notes will also be posted to Canvas.

Course Etiquette for Lectures: *(This may be refined as the course progresses.)* When your camera is on, please be mindful of your surroundings and try to place yourself somewhere that won't have distracting objects or activity in the background. Please keep your microphone muted when you are not speaking. If you have a question, please type it in the chat box. Wait until the instructor calls on you to speak.

Grading Policy: On all work, your grade will be computed as a percentage: the number of points you earned divided by the number of points possible. The weekly homework and exams are weighted as follows:
- Homework: 20% (lowest two scores dropped)
- Midterm #1: 20%
- Midterm #2: 20%
- Final: 30%
- Participation: 10%

Your letter grade will be given based on your numerical average earned in the class, on a scale not stricter than the following: you are guaranteed a D for 60.0 or above, C- for 70.0 or above, C for 73.0 or above, C+ for 77.0 or above, B- for 80.0 or above, B for 83.0 or above, B+ for 87.0 or above, A- for 90.0 or above, and an A for 93.0 or above.

Homework: Weekly homework assignments will be assigned via WeBWorK and due Fridays at 11:59pm. Solutions will be typically posted the following Tuesday at 11:59pm.

There will be 9 total homework assignments, and the lowest two will be dropped to accommodate exceptional situations such as serious illness or ordinary mishaps like forgetting to turn in the completed assignment. Because the lowest two scores are dropped, you can miss two assignments without penalty. On any given WeBWorK assignment, I will round scores of 90.0% and above up to 100%.

There is a practice assignment (worth no points) for you familiarize yourself with how WeBWorK looks and works.

To access WeBWorK for this class, go to webwork.uoregon.edu/webwork2/Math251-14143/. Your username is your DuckID: for instance, if your uoregon email address is ducky@uoregon.edu, your DuckID is "ducky" (without the quotation marks). Your password is the same as your UO email password.

WeBWorK can be frustrating at the start. WeBWorK is very sensitive to parenthesization, so it will not accept "$1/x + 3$" (i.e. $\frac{1}{x} + 3$) as correct if the answer is really "$1/(x+3)$" (i.e. $\frac{1}{x+3}$). One of the best things to do is to click the "Preview Answer" button to check that you have entered what you meant to enter. For the majority of problems, you will have infinitely many tries, so you don't need to worry about clicking "Submit Answer" before you are 100% sure.

The WeBWorK homework for the entire quarter is already posted, and I would highly encourage you to download the PDF of all of your WeBWorK homework problems and print them. There are many more exciting things to do on the computer than math homework, and so I'd recommend having your computer off so you can focus. Even though you only need to submit the answers on WeBWorK, you should still neatly write out your solutions on blank paper like you would for a written assignment. This way, you'll make fewer mistakes, and if you'd want to ask me a question about a problem, you can send me a picture of your work, and we can track down any mistakes. Also, remember that on exams showing your work will sometimes be required. It is important to practice this each week while doing your homework assignments.

If you have a question about a homework problem, one excellent resource is the "e-mail instructor" button at the bottom of the WeBWorK screen. Clicking on that and typing a short message about what you've tried on the problem will help me diagnose the issue you're having.

What you should NOT do: Do not send an email simply saying "What am I doing wrong on this problem?" or "I can't seem to get the right answer on this one." On most homework problems it is impossible to figure out what you are doing wrong if I only see your answer (which is all WeBWorK shows me).

What you SHOULD do: If WeBWorK tells you your answer is wrong, first go back over your work and see if you can find the mistakes yourself. If you can't, feel free to email me: but include a description of how you solved the problem as well as any work you did for intermediate steps. The more information you give, the more likely it is you will get a prompt and helpful reply.

For further tips, check out the Department's WeBWorK tips here: https://math.uoregon.edu/undergraduate/webwork. Here is a helpful list of available functions in WeBWorK: https://webwork.maa.org/wiki/Available_Functions.

Exams: There will be two midterm exams (in weeks 4 and 8 respectively) and one final exam. More details about exams will be released by the end of week 2.

E-mail: If you send me an e-mail, you can expect 24-hour turn-around on school days.

Participation: I've added a participation grade to help you succeed and stay engaged in this online environment. The 10% is broken down as follows:

- Attendance in Lecture (6%): There are 38 lectures, and you may miss eight classes without penalty. To get credit, *you must also have your video on and you must enter your full name as your screen name.* (Your facial expressions are an important source of feedback for me as I'm lecturing, and I need them! It helps me know when to slow down or clarify something.

Your names will help me connect names with faces.) If for some reason you cannot have your video on during a given lecture, you must ask or answer two questions in the chat.

- Presentation of a Problem (3%): During the quarter, I will meet with each of you one-on-one for 10 minutes. You'll present some pre-assigned homework problem to me. This is an opportunity for you to practice expressing yourself clearly in mathematics, and for me to give you some feedback on your mathematical writing.

- Student Questionnaire (1%): In the first week of class, you'll be asked to fill out a Student Questionnaire to help me get to know you better, and facilitate some course logistics. This is worth 1%.

If you're in a time zone where the lecture is the middle of the night, we will obviously change the computation of the participation grade.

Schedule: Here's the weekly plan. I'll post what we cover each day on Canvas.

Week 1. §2.1-2.5: Limits.

Week 2. §2.6: The difference quotient, definition of derivative, secant lines, average and instantaneous velocity.

Week 3. §2.7-3.1: Derivatives using the power rule, exponential functions. Also tangent lines and the derivative as a functions. Velocity and acceleration. Exponential growth.

Week 4.§3.2, 3.3: Product rule, quotient rule, trig functions.

Week 5. §3.4, 3.5: Chain rule, implicit differentiation.

Week 6. §3.4, 3.5, 3.7, 3.9, 4.1: Chain rule, related rates, linear approximation, implicit differentiation.

Week 7. §4.2, 4.3: Concavity, curve sketching, function optimization.

Week 8. §4.3, 4.5, 4.6: l'Hospital, improper limits, optimizations problems requiring modeling, curve sketching.

Week 9. §4.6, 4.7: Optimization, Newton's method.

Week 10. Review.

Office Hours: Virtual office hours are times you can meet with your instructor to discuss the material being covered in class, questions or concerns you might have, and other related issues. Join the Zoom meeting during office hour times using the links provided in Canvas. Feel free to join even if you don't have any questions. You can listen in on the conversation (which might spark a question for you)!

Textbook and Other Resources: The primary textbook is Stewart's *Calculus*. The textbook is of high quality, and you should read it. This does not mean that it is "easy" to read. Math books are quite demanding on the reader, owing to the intrinsic difficulty of the material, so do not be surprised if you have to go slowly.

   The Homework Help from the math library is continuing online this fall, beginning Tuesday September 29th. They'll be available for drop-in help via Zoom for students in lower level math classes (up to Math 252) Monday through Thursday 1pm – 7pm and Fridays 1pm – 5pm. Access the service through the sign-in form at https://library.uoregon.edu/scilib/mathlib.

Mental Health and Wellness: Life at college can be very complicated, especially in these times. Students often feel overwhelmed or stressed, experience anxiety or depression, struggle with relationships, or just need help navigating challenges in their life. If you're facing such challenges, you don't need to handle them on your own—there's help and support on campus.

As your instructor if I believe you may need additional support, I will express my concerns, the reasons for them, and refer you to resources that might be helpful. It is not my intention to know the details of what might be bothering you, but simply to let you know I care and that help is available. Getting help is a courageous thing to do—for yourself and those you care about.

University Health Services help students cope with difficult emotions and life stressors. If you need general resources on coping with stress or want to talk with another student who has been in the same place as you, visit the Duck Nest (located in the EMU on the ground floor) and get help from one of the specially trained Peer Wellness Advocates. Find out more at `health.uoregon. edu/ducknest`.

University Counseling Services (UCS) has a team of dedicated staff members to support you with your concerns, many of whom can provide identity-based support. All clinical services are free and confidential. Find out more at counseling.uoregon.edu or by calling 541-346-3227 (anytime UCS is closed, the After-Hours Support and Crisis Line is available by calling this same number).

Accessible Education: The University of Oregon is working to create inclusive learning environments. Please notify me if there are aspects of the instruction or design of this course that result in disability-related barriers to your participation. You are also encouraged to contact the Accessible Education Center in 360 Oregon Hall at 541-346-1155 or uoaec@uoregon.edu. For more information, see `https://aec.uoregon.edu/`.

Eduational Equity: There are rightly a lot of discussions about educational inequity, whether that inequity is caused by living situation, time zone, disabilities, etc. These are real concerns. This syllabus is written from the perspective that, in general, it's far better to make a policy and proceed by it, but reconsider aspects when obviously necessarily. E.g. of course we'll change the way that participation is computed if you're currently in Asia or Australia and the lectures are happening in the middle of the night for you. Similarly, if you will not be attending the lectures in a place you feel comfortable turning on your webcam, we will find an alternate solution. We write out the general policy because it provides transparency, clarity, and a sense of normalcy since all learning environments have guide rails. Please send me an e-mail if you have a problem. I care about you. And if you're concerned about educational equity for others, know that so are we, and we are working to mitigate it.

Academic Integrity: The University Student Conduct Code (available at `conduct.uoregon.edu`) defines academic misconduct. Students are prohibited from committing or attempting to commit any act that constitutes academic misconduct. By way of example, students should not give or receive (or attempt to give or receive) unauthorized help on assignments or examinations without express permission from the instructor. If there is any question about whether an act constitutes academic misconduct, it is the students' obligation to clarify the question with the instructor before committing or attempting to commit the act.

Course Privacy Statement: Students may not audio or video record class meetings without permission from the instructor. For videos posted by the instructor, students may keep these recordings only for personal use and may not post recordings on the internet or otherwise distribute

them. These policies protect the privacy rights of instructors and students, and the intellectual property and other rights of the university.

It is important that you do not share our course Zoom links or meeting passwords with anyone outside of our course to protect the privacy of everyone in attendance.

Advice: I strongly encourage you to attend lecture. While the lectures will be recorded and posted, and the notes are being posted as well, I think you'll find that recorded live lectures with no editing are painful to watch. (I've watched enough to know this personally.) I would suspect that despite your best intention of watching the recorded lectures, you'll find yourself putting off watching the lectures, or choosing to watch Netflix instead. Additionally, the purpose of lectures is not just for you to absorb material, but to contribute. You'll get a lot more out of this class if you take this perspective.

The Math Department has some great advice here: `https://math.uoregon.edu/undergraduate/tips-for-success`.

Important Dates:

First day of classes .... September 29, 2020
Last day to drop classes without 'W' .... October 3
Last day to add classes .... October 5
Last day to withdraw from classes .... November 15
Thanksgiving vacation .... November 26-27
Last day of classes .... December 4
Final examination period .... December 7-11