Math 111: Calculus: Differentiation

Fall 2021

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Office: Herman Brown Hall 420
Classroom, time: RZR 123, TR 9:25-10:40am
Course webpage: https://canvas.rice.edu/courses/41517

Office Hours: Mon 1:30-2pm, Tues 4:30-5:30pm, Wed 10-10:30am, 1-2pm. My posted office hours are time that I reserve for students—feel free to come without notice, and stay as long as you like. You may also email me to make an appointment to meet outside of office hours.

Calendar: A calendar for the course is maintained on the course webpage. It gives a schedule of the material to be covered each day, and links to resources.

Textbook: OpenStax Calculus Volume 1. This book is free and can be downloaded as a pdf here: https://tinyurl.com/nuxf5zpc.

Piazza: This class will use Piazza, an online forum for asking and answering questions. I will check in frequently on the Piazza page and answer questions in as timely a manner as possible. Students can also answer other students' questions (and I encourage you to do so!). You can the Piazza page for our class here:

https://piazza.com/rice/fall2021/math111/home

Use the access code **Math111F21** to access the course. Note that other than office hours, Piazza is the preferred method for asking question about course content (homework, concepts, etc.). When you ask a question on Piazza, the whole class benefits from the discussion. In addition, you can ask your question anonymously, if you prefer. When a new question appears, I will get email notifications, so there is no need to send a separate email about a question.

Course Delivery: The course will be held in person. This is subject to change pending changes is Rice policy.

Course Aims: Whatever math we learn in this course, we will first and foremost be guided by the 4 axioms of Dr. Federico Ardila-Mantilla:

> Axiom 1. *Mathematical potential is distributed equally among different groups, irrespective of geographic, demographic, and economic boundaries.*
>
> Axiom 2. *Everyone can have joyful, meaningful, and empowering mathematical experiences.*
>
> Axiom 3. *Mathematics is a powerful, malleable tool that can be shaped and used differently by various communities to serve their needs.*

Axiom 4. *Every student deserves to be treated with dignity and respect.*

The focus of this course is differentiation of single variable functions, which is really about trying to understand the rate that a quantity is changing at a moment in time. We live in a universe of constant change, so it should be no surprise that developing a mathematical framework for understanding change is extremely useful. An important example that you likely already understand quite well on an intuitive level is velocity—the rate that an object's position is changing at a moment in time. But the derivative can tell us about far more than just velocity; we can use it to compute the rate of change of other quantities, and even to examine how one quantity changes relative to another. In order to compute velocity, and other more adventurous derivatives, we need to be able to sneak up on a single moment. Thus we will first need to study *limits*, the ingenious bit of sneakery that makes all of calculus possible. First, though, we will begin the course by reviewing functions, and gaining familiarity with the most common types of functions that arise in math and science.

Exams: There will be two Midterm exams, and a Final exam. The first midterm will be on **Wednesday, October 6th** and the second will be on **Wednesday, November 10th**. As of now, the plan is to hold exams in person, in a Rice classroom yet to be decided. This may change depending on Rice policy.

The final exam will also tentatively be held in person, on a date to be decided by the registrar. **The final exam will be cumulative**, but with an emphasis on the material covered since Midterm 2. It is the policy of the Mathematics Department that no final may be given early to accommodate student travel plans. If you make travel plans that later turn out to conflict with the scheduled exam, then it is your responsibility to either reschedule your travel plans or take a zero on the final.

The exam question on Midterm 1 for which the class average is the lowest will appear again on Midterm 2 (possibly with very minor changes). If your score for this question is higher on Midterm 2, then this higher score will take the place of your low score on Midterm 1 for that question. Similarly, there will be a question from Midterm 2 repeated on the Final exam, and scoring will work in the same way as described above.

The exams are closed note, closed book, and use of a calculator or any other outside resource such as a computer, a website, or another person is prohibited. Any evidence of cheating will be promptly referred to the Honor Council.

Homework: The course will have both online and written homework. WebWork will be used for online homework, and may be accessed at

https://webwork.math.rice.edu/webwork2/Math111Fall21Worden/.

Initial login to WebWork can be done using your net ID as username and student ID as password. You should then change your password. Online homework will be assigned every class day (possibly with a couple of exceptions). WebWork assignments assigned on Tuesday will be due on Friday evening, and WebWork assignments assigned on Thursday will be due on the following Monday evening. For each assignment, there is a 2-day grace period after the due date, during which you may complete the assignment for 75% credit. In order to benefit as much as possible from WebWork, when working on assignments you should work your solutions on paper as you would if you were going to hand them in (i.e., neatly and showing all work), then enter the solutions online. Additionally, it is HIGHLY RECOMMENDED that you complete the WebWork assignment on the day it was assigned, or within a couple days of that, while the material is fresh.

There will also be weekly written homework. These will be assigned on Thursday of each week, and due the following Thursday at 8am. To receive full credit on written homework, your solutions should be complete, with all work shown, and neat. Written homework will be managed via Gradescope (see below). Because I understand that students sometimes encounter technical difficulties when uploading to Gradescope, there is a 4hr grace period after the due time of 8am, so you will still get full credit if you submit by 12pm. On the calendar, written homework assignments appear on the day on which they are assigned, and the due date is indicated. Directly to the right is a link to the solutions, which will become active at 12pm on the day the assignment is due.

As a policy, late homework is not accepted—though exceptions may be made in extreme circumstances, on a case by case basis. **However, the three lowest-scoring WebWork assignments will be dropped at the end of the semester, as will the lowest-scoring written homework assignments.**

Gradescope: Written homework will be managed through Gradescope. You can self-enroll in the course using the class code: **4PY2XD**. For instruction on using Gradescope to submit homework, see this PDF: https://tinyurl.com/y3wxdewr. **Please make sure Gradescope submissions are clear, and oriented correctly (not sideways), and solutions are correctly linked to pages.**

Working on homework with others: You are encouraged to work with your classmates on homework, with the following considerations. First, you should give serious thought to an exercise, and try to come to a solution by yourself, before discussing it with others. The purpose of collaboration is to help each other understand the concepts, think about the problem, and discuss approaches to reaching a solution. Your goal should be to come out of a collaboration with an understanding of how to do a certain type of problem, not just the particular problem you were assigned. Most importantly, you should always write up your solutions (or submit them to WebWork) on your own.

On the written homework, you should show all the steps you took to arrive at an answer, and you should understand what you are writing well enough that you do not need to refer to any notes produced during you collaboration.

Whether working by yourself or with others, you should never look up solutions to problems online. Calculators will not be allowed for exams, and therefore you should not use them when working on homework (unless directed otherwise). It is your duty under the Honor Code, and in your own best interests as you prepare for exams, to follow the above guidelines.

Attendance: Attendance will not be required, but it is strongly recommended that you attend class regularly, as attendance is positively correlated with success in this class. If you are unable to attend class regularly, please let me know so that we can discuss how you can get the most out of the course remotely.

Grading: Online and written homework will together account for 25% of your grade (10% for online, 15% for written). The three exams (Midterm 1/Midterm 2/Final) will be worth a total of 75% of your course grade, and will be weighted (2/2/3) or (2/1/4) or (1/2/4), whichever gives you the highest grade.

Collegiality and Respect: The Department of Mathematics supports an inclusive learning environment where diversity and individual differences are understood, respected, and recognized as a source of strength. Racism, discrimination, harassment, and bullying will not be tolerated.

We expect all participants in mathematics courses (students and faculty alike) to treat each other with courtesy and respect, and to adhere to the mathematics department standards of collegiality, respect, and sensitivity as well as the Rice Student Code of Conduct. If you think you have experienced or witnessed unprofessional or antagonistic behavior, then the matter should be brought to the attention of the instructor and/or department chair. The Ombudsperson is also available as an intermediate, informal option, and contacting them will not necessarily trigger a formal inquiry.

Title IX Responsible Employee Notification: Rice University cares about your wellbeing and safety. Rice encourages any student who has experienced an incident of harassment, pregnancy discrimination or gender discrimination or relationship, sexual, or other forms interpersonal violence to seek support through The SAFE Office. Students should be aware when seeking support on campus that most employees, including myself, as the instructor/TA, are required by Title IX to disclose all incidents of non-consensual interpersonal behaviors to Title IX professionals on campus who can act to support that student and meet their needs. For more information, please visit safe.rice.edu or email titleixsupport@rice.edu.

Disability Resources: If you have a documented disability that may affect academic performance, you should: 1) make sure this documentation is on file with Disability Resource Center (Allen Center, Room 111 / adarice@rice.edu / x5841) to determine the accommodations you need; and 2) contact me to discuss your accommodation needs and provide me with a copy of your Accommodation Letter.

Disclaimer: This syllabus is subject to change, though I will do my best to avoid this. Students will be notified of any changes as early as possible, and will be consulted for feedback as these decisions are made.