Mathematics 113 (Calculus I)
Fall 2023

Instructor

Prof. Burton (Section 01)

- Class: MTWF 9 - 9:50 LIST 227
- Office Hours: MTWF before class/10-12:00 and by appointment
- Office: CJ Math Common Room
- Lumen Course ID: 71876
- Lumen Enrollment Key: burton113

Course Overview

Calculus is fundamentally different from the mathematics that you have studied previously. Calculus is focused on change and motion. One of the basic foundations of Calculus is the concept of a limit which arises as we attempt to solve a variety of problems. We use limits to calculate unknown quantities as the limit of other more easily calculated quantities. Calculus 1 is based upon calculating the slope of a tangent line and the area of irregular shapes. Sir Isaac Newton created his version of Calculus to explore the motion of planets around the sun. Since then, Calculus has been used to explore many more concepts in science, astronomy, medicine, economics, and business. As we learn Calculus this semester, we will incorporate various applications to try to give you a taste of its uses beyond mathematics.

Textbook/Homework

I will be using an online homework management system through the website ohm.lumenlearning.com. You will need to create an account ***using the above Course ID and Enrollment Key for your instructor***. The cost for the use of Lumen Learning is $30, which is payable when you create your account. This site includes an online textbook as well as homework assignments that will be due on Sundays and Wednesdays by 10pm. I will also post homework assignments that will be submitted via www.gradescope.com each Monday by 10pm.

Mathematics is learned through doing. A key to success in this class will be doing all the assigned homework. Collaboration with your fellow classmates and your instructor is encouraged when completing your homework assignments. Collaboration is defined as ***to work jointly with others*** especially in an intellectual endeavor. Any collaboration or use of outside resources on assignments must be specifically documented when submitted. Written assignments and tests must be your own work. Copying someone else's work violates the honor code. *"I affirm, on my honor, that I will abstain from dishonesty in all academic work. I have read and understand the Honor Code and I will abide by its provisions. I will work to strengthen the honor of Hamilton College and its students by upholding the Honor Code myself and working to ensure others do as well."*

Prerequisites

All students taking Calculus I should have a solid foundation in high school level algebra and trigonometry. This would include understanding functions: linear, quadratic, polynomial, rational, exponential, logarithmic, and trigonometric. If you have any concerns regarding your mathematical preparation, there are optional supplemental review sections available in the Lumen course. The QSR Center is also an excellent option with numerous resources designed to help you review your algebraic and trigonometric skills.

Office Hours

Office hours are an excellent opportunity for one on one assistance and group collaboration regarding homework and/or test prep. The space at CJ on the first floor is a great place to work and collaborate. My goal in helping you is not to merely give you the solution but to guide you to understand the problem and the process on your own. You should always attempt the problem on your own before seeking extra help.

The QSR Center

The Quantitative and Symbolic Reasoning (QSR) Center, located in 303 Christian A. Johnson Hall, offers free drop-in and individual peer tutoring in introductory level courses containing a mathematics/quantitative component, as well as statistical support. Students may come to the center to work on homework, to work with a tutor, to review specific topics, or to use the resources of the computer lab and library. The tutors are advanced mathematics majors who can help you with homework problems and preparing for exams. The QSR is open for drop-in tutoring Monday through Thursday 12-9pm, Friday 12-5pm, and Sunday 4-9pm. They will also conduct review sessions before each exam. The QSR Center is an excellent supplement to office hours.

Embedded Tutoring Program

In addition to the free drop-in tutoring that is available to all students through the QSR Center, there is a special program, called embedded tutoring, that you will have the option to sign up for to get extra help outside of class. If you join the program you are making a commitment to attend weekly group meetings where you work with a peer tutor who helps you to reinforce concepts from class and brush up on important skills. You would be an ideal candidate for the embedded tutoring program if you are feeling a little rusty with your math skills and are willing to devote some extra time each week to staying on top of the material. To join the group or to learn more about the program, check with your professor and/or the embedded tutor.

Expectations and Grades

To do well in this course you will need to meet certain basic expectations for attendance, behavior, and work. This includes arriving to class each day on time, ready to participate, with the proper materials, and with all assigned work completed. Unexcused absences will have a negative impact on your grade. If you ever need to miss class (for example, if you are sick), then you are still responsible for material covered and announcements made in class, and you should consult with a classmate or your instructor to find out whether any change in the schedule was made. The pace of the class is brisk with new material covered in each lecture.

Being in class is not enough. When present at class meetings, you should contribute positively to the course by actively engaging in the class and by ensuring that everyone present has an opportunity to work and learn. Any behavior that disrupts the business of the class, by distracting the professor or other students, is unacceptable. Be an active participant in the learning process, not just a spectator.

“What we must learn to do, we learn by doing.” (Aristotle)

Mathematics is certainly an example of learning through doing. One key to success in this class will be completing all assigned homework. You should try the homework on your own before seeking help. It is important to understand each lecture to understand the following lecture as mathematics is a subject that constantly builds on previous understandings. You must make a good faith effort to do all the assigned work as a course requirement. You should try to understand the concepts presented, not just memorize the procedure to apply. If you find that you are struggling, it usually points to insufficient practice or lack of correct review and preparation before the exam. As soon as you feel yourself begin to struggle, please seek out the help that you need from the QSR Center, through office hours, using the embedded tutor, and/or each other..

Mathematics is also a subject that benefits from the concept of learning from your mistakes; otherwise you are destined to repeat them. Any time you miss a question on your homework or on a test, it is important for you to figure out why and where the mistake was made. This time and effort will pay off in the long run as the course continues, as similar problems are encountered, and as you move forward in your study of mathematics.

Coming to class, doing your homework, preparing for tests, seeking extra help when needed, and actively participating in class will add to your grade potential. There will be four major exams and a cumulative final exam. There will be online homework through Lumen due twice a week as well as paper and pencil homework to be turned in each Monday. The breakdown for your grade is as follows:

- Each major exam 15% (total of 60%)
- Final exam 20%
- Online Lumen homework 10%
- Written homework 10%

Calculus is not an easy subject, but Calculus is also not an impossible subject. Putting forth a consistent work ethic and effort, attending classes, asking questions, seeking extra help when necessary, practicing through homework, the QSR Center, your fellow classmates, and preparing for tests will all help to make what may seem impossible more manageable.

Grades are updated through Lumen and Blackboard so there should be no surprises as the end of the semester draws near. Waiting until the final examination period to figure out how to improve your grade will not be a wise decision.

Calculators and Technology

You are allowed to use calculators and other technology as much as you want on homework, but you will ***not*** be allowed to use them on exams. So as you do your homework, it would be wise to use these devices as little as possible to avoid becoming dependent on them. You should work through each problem using only pencil and paper, and only use technology at the end if you need to compute a numerical final answer. On exams (where use of technology is forbidden), you will not need to simplify your final answers.

Learning Disabilities

Hamilton College will make reasonable accommodations for students with properly documented disabilities. If you are eligible to receive an accommodation(s) and would like to make a formal request for this course, please discuss it with me as soon as possible. You will need to provide Allen Harrison, Assistant Dean for Accessibility Resources (aharriso@hamilton.edu) with appropriate documentation of your disability.

Written Homework

- #0 review material due Monday August 28th
- #1 limit of a function/limit laws due Monday September 4th
- #2 continuity/definition of a derivative due Monday September 11th
- #3 derivative as a function/differentiation rules due Monday September 18th
- #4 rates of change/derivatives of trig due Monday September 25th
- #5 chain rule/general power rule/inverse trig/implicit differentiation due Monday October 2nd
- #6 exponential and log functions due Monday October 9th
- #7 related rates due Monday October 16th
- #8 maxima and minima/mean value theorem due Monday October 23rd
- #9 curve sketching/limits at infinity and asymptotes due Monday October 30th
- #10 optimization/L'Hopital's Rule due Monday November 6th
- #11 antiderivatives/approximating areas/definite integrals due Monday November 13th
- #12 fundamental theorem of calculus/net change due Monday November 27th
- #13 u-substitution/integration with exp/log/inverse trig due Monday December 4th

Exams

There will be four regular exams during the semester as well as a cumulative final examination.

- Limits/definition of derivative Wednesday, September 13th
- Derivatives of functions Wednesday, October 11th
- Applications of derivatives Friday, November 3rd
- Integration Tuesday, December 5th
- Final Exam Wednesday, December 13th 9am - noon