

Calculus 1 with FUNdamentals

MATH 133, Fall 2019

MF 10:00 – 10:50, TuTh 9:30 – 10:45, Haberlin 219

Professor Gareth E. Roberts

Contacting me: Office: Haberlin 305, e-mail: groberts@holycross.edu phone: x2350

Office hours: Mon. 11 – 12, Tues. 11 – 12, Wed. 10 – 11, Thurs. 11 – 12, or by appointment.

Required Text: *Calculus: Single Variable (Early Transcendentals)*, third ed., Jon Rogawski and Colin Adams (bundled with WebAssign for \$119.75 in the College Bookstore).

Web page: <http://mathcs.holycross.edu/~groberts/Courses/MA133/homepage.html>

Homework assignments, worksheets, class handouts, exam materials, useful links and other important information will be posted at this site. Please bookmark it!

Course Objectives:

- Develop an understanding for the techniques and theory of one variable calculus.
- Improve confidence in your mathematical abilities.
- Become proficient at making clear and coherent mathematical arguments.
- Work and communicate with your peers.
- Have FUN while learning calculus!

Syllabus: The main focus of the course is the study of real-valued functions of a single variable, particularly, rates of change of functions. The subject will be approached from both a conceptual and a computational viewpoint. Rather than just learning a set of formulas, techniques and algorithms, the theory and applications of calculus will be central to our study. The text has been chosen with this goal in mind. Many of the exercises require a solid understanding of concepts as opposed to a cursory “plug-and-chug” approach.

This course meets five hours a week, allowing for a slower pace and the opportunity to address any deficiencies in your mathematical training. I hope to build a safe and supportive environment that will help you gain confidence in your abilities and increase your comfort level with mathematics.

A tentative outline of the course is given below. We will cover most of the material in the text from Chapters 1 through 4, as well as Sections 5.1–5.4.

- Functions: linear, quadratic, exponential, logarithmic, trigonometric, polynomials, piecewise (6 classes)
- New functions from old: shifting, stretching, composition, inverses (3 classes)
- Limits: instantaneous velocity, asymptotes, graphical and numerical approaches (3 classes)
- Exam I
- Limits: basic laws, continuity, algebraic evaluation of, squeeze theorem, trig limits, limits at infinity, Intermediate Value Theorem (9 classes)

- The derivative: tangent line, rates of change, limit definition of, derivative function, power rule (4 classes)
- Exam II
- Differentiation rules: product, quotient, chain rule, trig, implicit, exponential, logs (9 classes)
- Applications of the derivative: absolute extrema, Mean Value Theorem (2 classes)
- Applications of the derivative: first and second derivative tests, curve sketching, L'Hôpital's rule, optimization (6 classes)
- Exam III
- Integration: approximating area under a curve, the definite and indefinite integral, the Fundamental Theorem of Calculus (6 classes)
- Calculus Jeopardy (last class)
- Final Exam (Cumulative)

The Flipped Classroom: Most of our classes this semester will consist of problems and worksheets for you to complete in groups. For these classes there will not be a traditional lecture, but rather the class is “flipped” so that active student learning is the primary focus. You will be expected to prepare for these classes by completing a few problems on WebAssign and/or reading the text beforehand.

Homework: There will be homework due every Thursday at the start of class, except for the weeks in which a midterm exam is scheduled. Homework will consist of two parts, an online component to be completed using the system **WebAssign** and a hand-written portion consisting of selected problems from the course textbook.

Late homework will not be accepted. While you are allowed and encouraged to work on homework problems with your classmates, the solutions you turn in or enter on the computer should be your own work. No help from any Internet sources other than those offered by WebAssign is allowed. Plagiarism will not be tolerated and will be treated as a violation of the Departmental Policy on Academic Integrity.

In order to access WebAssign, you will need a **Class Key**. The Class Key for this course is [holycross 1005 6728](https://www.holycross.edu/holycross/1005/6728) . If you did not purchase an access code as part of your bundled textbook from the College Bookstore, then you will eventually need to purchase one directly from WebAssign. You will have free access to WebAssign until Sept. 18.

It is recommended that you take advantage of the **Calculus Workshop**, a drop-in peer tutoring center, open Sunday through Thursday from 7:00 - 9:00 pm in Swords 321. This is an excellent place to get help while you are working on homework problems or studying for exams. In addition, Emily O'Regan (HC '21) will be serving as a teaching assistant for the class and will hold her own office hours as well as conduct exam review sessions.

Quizzes and Exams: There will be a weekly quiz given at the start of class every Friday, except for weeks in which a midterm exam is scheduled. These will be short, one- or two-problem quizzes designed to keep you abreast of the current course material. The lowest quiz grade of the semester will be dropped.

There will also be three midterm exams and a comprehensive final at the end of the semester. The exam schedule is given below. We will typically hold evening review sessions before each midterm. Please make a note of these dates and plan accordingly. Any conflicts must be legitimate and brought to my attention well before the exam is scheduled.

If you have any specific learning disabilities or special needs and require accommodations, please let me know early in the semester so that your learning needs may be appropriately met. You will need to obtain an accommodation letter from the Office of Accessibility Services (Hogan 215A, x3693).

Exam Schedule:	Exam 1	Thurs., Oct. 3	In Class
	Exam 2	Thurs., Nov. 7	In Class
	Exam 3	Thurs., Dec. 5	In Class
	Final Exam	TBA	2.5 hours

Academic Integrity: The Department of Mathematics and Computer Science has drafted a policy on academic integrity to precisely state our expectations of both students and faculty with regards to cheating, plagiarism, academic honesty, etc. You are required to read this policy and sign a pledge agreeing to uphold it. A violation of the Departmental Policy on Academic Integrity will result in a 0 for that assignment or exam, and a letter describing the occurrence of academic dishonesty will be sent to your Class Dean.

Diversity and Inclusion: It is my intent that students from all diverse backgrounds and perspectives be well-served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength, and benefit. Any suggestions you have pertaining to diversity and inclusion are encouraged and appreciated.

Grade: Your course grade will be determined by the scores you receive for each of the following items:

- participation (includes in-class work, preparedness, attitude, effort) 8%
- homework 12%
- quizzes 10%
- midterm exams 45%
- final exam 25%

How to do well in this course:

- ATTEND CLASS, PARTICIPATE and ASK QUESTIONS.

I take pride in my lectures and will work hard to get you to master the course material. However, this will not be of much use to you if you don't attend class. Furthermore, on those special days when the classroom is "flipped," it is up to you to come prepared for class. Taking some initiative beforehand will result in a better learning experience for you. Do not take for granted the privilege you have of attending college. Value your time here and I will make it worth your while.

- DO YOUR HOMEWORK REGULARLY.

The best way to learn mathematics is to *do* mathematics. This means mastering the material to the point where you could explain it to your classmates and friends. “You don’t really learn the subject until you teach it,” is a common adage amongst mathematicians. It is not enough to know how to mimic an algorithm. A strong student should be able to follow and propose arguments as to why an algorithm is working or not working.

- WORK WITH YOUR CLASSMATES.

Some of the best assets available to you are the knowledge and abilities of your peers. Learn to explain mathematics to your classmates. Mathematics can be fun and rewarding when there are people around you who enjoy figuring out problems as much as you do. Take advantage of this opportunity and organize study groups outside of class.

- ASK FOR HELP WHEN NECESSARY.

Ask for help when you need to. One of the stumbling blocks for many math students is being afraid to ask for help. Just do it! It’s actually ok to admit that you don’t understand something. Some might even characterize it as a strength.

Never regard study as a duty, but as the enviable opportunity to learn.

— Albert Einstein

